The Builder.

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Administrative Engineering at the Paris Exhibition.

AMONGST the features of interest in the Paris Exhibition none are more worthy of attention than the installations dedicated to the service of exhibitors and the public; and some record of the system employed may not only be of interest for the moment, but may be useful as a suggestion for the working, in this respect, of future great exhibitions on other sites.

Systems designed for the distribution of power, light, and water depend alike upon the central embodiment of energy to be found in the boiler department. It is therefore appropriate that our brief review of administrative services should commence with some notes upon the "Bâtiments des Chaudières" and their equipment. There are two boiler-houses, situated on either side of the Salon d'Honneur, their ends bounded respectively by the Avenue de la Bourdonnais and the Avenue de Suffren. Each building measures 383 ft. long by 131 ft. wide, and contains two rows of boilers, linked together by steam pipes which communicate with the general distributing mains. Thus all the generators become units in one great system, constituting the fountain-head of activity for that part of the Exhibition which is within the walls of Paris. The boilers are disposed back to back in ranges of twenty, and between the ranges in each boiler-house is a central passage 13 ft. in width, along which are railway tracks running from the Champ de Mars station, so that fuel may be delivered in trucks directly upon the site. When we state that about 200 tons of coal are consumed daily, the advantage of this arrangement will be fully appreciated. Beneath the rails are two parallel galleries conveying products of combustion from the boiler flues to the chimney shafts immediately outside the two buildings. These underground galleries are built of brick on a foundation of *béton;* the spaces between the two inner walls are filled with sand, in order to provide for expansion by heat, and they increase in height as the chimneys are approached, the maximum internal dimensions being about 15 ft. high by 8 ft. 6 in. wide.

Both chimney shafts were built by MM. Nicou & Damarigny, whose designs were accepted as the result of a competition. The height of each shaft is 263 ft. above ground level; the external diameter is 39 ft. 4 in. at the base, whilst the internal measurements are 20 ft. 4 in. at the base and 14 ft. 9 in. at the top. As the total weight to be carried by each foundation is more than 7,850 tons, specially careful treatment was necessary. Through a stratum of soft clay, encountered at the depth of about 26 ft., piles were driven to the rock level situated nearly 60 ft. below the surface; the upper ends of the piles were then embedded in *béton* to a depth of 5 ft., and upon this bed, 60 ft. in diameter, a masonry foundation was built to the ground level. The lower portion of the work was executed by the aid of external scaffolding and the remainder by internal platforms. An attempt has been made to impart an artistic appearance to the chimneys by the use of light-tinted ceramic bricks for facing and by the introduction of designs in bricks of various colours, but the idea conveyed is merely that of a somewhat decorated factory chimney. The cost of the two shafts is stated at 16,240*l.*, and 3,000,000 ordinary bricks were required without reckoning ceramic bricks.

So far as the boilers themselves are concerned, it may be mentioned that the gallery adjoining the Avenue de la Bourdonnais is reserved for French makers, amongst whom are the Babcock & Wilcox French Company; the Compagnie de Fives-Lille; De Naeyer & Cie., of Willebroeck; and J. & A. Niclausse, of Paris. In the gallery next the Avenue Suffren, where the rest of the world is permitted to exhibit, the plant includes boilers by Babcock & Wilcox, U.S.A.; Berninghaus, of Duisberg; Dereux, of Duren; Fitzner & Camper, of Sosnowice; Galloways, of Manchester; the H. Pancksh Actien Gesellshaft, of Landsberg; Simonis & Lanz, of Frankfort; and Steinmuller, of Gummersbach. Out of the eighty boilers installed only six are of English make, and more than half of the total number are of the water-tube type.

Some idea of the collective power represented by the boiler installation is furnished by the fact that 44,000 gallons of water must be evaporated per hour to supply the engines with steam. Beyond this a vast quantity of water is required for condensing plant and other purposes, as we shall describe later. Steam is collected from the boilers by mains of 10 in. diameter, carried along each side of the building, and before entering the distributing mains it passes through equalising cylinders, so that a uniform pressure of 140 lbs. per square inch may be ensured. It should be remarked that some of the engines are unable to exert their full power, being designed for using steam at higher pressures, whilst others intended for lower pressures than 140 lbs. per square inch are necessarily provided with reducing valves.

In the machinery gallery, of which one-half is devoted to France and the remainder to foreign nations, steam is supplied to upwards of forty engines and dynamos capable of developing fully 40,000 h.-p. Of this power only about one-half is required for administrative purposes, 5,000 h.-p. being used for power and 15,000 h.-p. for electric lighting. We must candidly admit that Great Britain makes a very poor show in this department of the Exhibition. Messrs. Willans & Robinson have a very fine central valve engine of 2,500 h.-p., which suffers in appearance because the front could not be placed facing the central avenue of the hall. Messrs. Galloway exhibit a compound vertical engine and dynamo of admirable design and massive construction. The engine is capable of developing 680 i.-h.-p. with steam at 150 lbs. pressure; and the dynamo by Messrs. Mather & Platt, designed for lighting or power circuits, has an output of from 220 to 250 volts and 1,400 amperes. Messrs. C. A. Parsons & Co. have two

steam turbines driving dynamos for lighting purposes, the arrangement being exceedingly neat and compact. Beyond these three exhibits there is very little worthy of special mention, but a certain amount of melancholy satisfaction may be derived from the fact that the United States is only represented by one engine built by the Société Française de Constructions Mécaniques, from the designs of the E. P. Allis Company, of Milwaukee. On the other hand, the productions of French, German, and Swiss firms are particularly varied, including numerous engines of considerable power, admirable design, and excellent workmanship. As specially exemplifying these characteristics we may refer to the exhibits of Herr A. Borsig, Berlin, and of MM. Sulzer Frères, Winterthur. Owing to our efforts in the past to restrain the adoption of electrical appliances as far as possible, we have clearly been outclassed by foreign nations, many of whom are now making better machinery than is turned out by our own manufacturers, though perhaps not better than they could produce if the necessary encouragement were forthcoming.

Electrical energy generated in the machinery gallery is distributed to all parts of the Exhibition where power is required. Thus the old fashioned method of power transmission by means of shafting and belts is avoided, and the authorities have been enabled to operate useful machinery in widely separated positions from a central power house, instead of being compelled to establish a number of auxiliary stations at isolated points. The great facility afforded by electricity for the distribution of power has no doubt had the further, and unfortunate, effect of encouraging the administration to scatter exhibits of machinery in motion all over the Exhibition in the most inconvenient and incongruous positions. No doubt the idea of collecting together all appliances incidental to different manufactures is excellent in its way, but it is utterly impracticable on a large scale. For instance, one firm may produce a dozen kinds of machines, each available for a dozen distinct industries. Carrying the French notion to its logical conclusion, such a firm as we have indicated would require 144 separate stands. Electricity is conveyed from the generators to the two switch-rooms, each about 99 ft. long, situated behind the cascade of the Château d'Eau. From the Bourdonnais section alternating tri-phase currents are distributed at tensions varying from 2,200 to 5,500 volts, according to distance, and from the Suffren section continuous currents are furnished at 125, 250, and 500 volts tension. Ten lines of cable serve to convey high tension currents to various parts of the Exhibition area as follows :—

Entrée Monumentale and Foreign Department of the Esplanade des Invalides, 740 kilowatts.

French Department of the Esplanade des Invalides, 670 kilowatts.

Champs Elysées, 200 kilowatts.

Cours la Reine and Quai de Billy, 500 kilowatts.

Quai d'Orsay, 240 kilowatts.

Palais du Trocadéro and vicinity, 2,200 kilowatts.

Champ de Mars, two lines of 200 kilowatts and one line of 300 kilowatts.

And, finally, one line of 300 kilowatts for operating "Rampes Mobiles," or inclined elevators, in the palaces on the Esplanade des Invalides.

As a general practice the cables are carried beneath the surface, those conveying high-tension currents being provided with a protection of lead outside the insulating material, and sheathed with a winding of steel strips. The aggregate length of the main lines of cable is approximately 23 miles. Although we need not enumerate all the electric lamps installed in various parts of the Exhibition, it may be interesting to mention a few figures relative to the principal buildings and gardens. At the Entrée Monumentale there are more than 3,000 incandescent, and thirty-six arc lamps, twenty-four of which are furnished with reflectors; the two palaces on the Esplanade des Invalides are provided with 2,136 incandescent lamps, and the grounds with fifty-nine arc lamps; the Alexander III. bridge is lighted by 508 incandescent lamps of 16 c.-p. On the Champs Elysées there are 174 arc lamps; the Château d'Eau has 1,100 incandescent lamps, in addition to which lamps of considerable power are used for illuminating the fountains; the Palace of Electricity is fitted with 5,000 incandescent lamps, four arc lamps with reflectors and eight coloured search lights. The Salle des Fêtes contains 4,500 incandescent lamps; and the Eiffel Tower is provided with 7,000 incandescent lamps of 10 c.-p. All the remaining Exhibition buildings and those devoted to what are called "attractions" are well lighted, and this remark applies especially to the Palais Lumineux Ponsin.

We will now look a little into the details of arrangements adopted for the distribution of steam and water, and in order that matters may be the more intelligible a few notes are desirable as to the quantities dealt with, and to the general outlines of the system followed. It has already been stated that 44,000 gallons of feed water per hour are evaporated by the boilers. This volume of water represents 440,000 lbs. weight of steam. At the pressure used (140 lbs. per square inch) the weight of steam mentioned is equivalent to about 1,260,000 cubic feet, and the steam mains must be capable of dealing with this volume every hour. Moreover, as the temperature of the steam is 361 deg. Fahr., adequate covering of the pipes is necessary in order to minimise losses by radiation and contact of air. In addition to the 44,000 gallons of boiler feed water, at least 1,000,000 gallons per hour is necessary for condensers, as all the engines are of the condensing type. Moreover, other supplies, both of river and drinking water, have to be distributed to various parts of the Champ de Mars, and hot water from the condensers has to be returned to the river. Altogether about 1½ million gallons of water are supplied hourly, or 10½ millions per day of seven hours, a quantity sufficient for the supply of thirty gallons per head daily to a city of 350,000 inhabitants. Water discharged from the cascades and fountains of the Château d'Eau is collected and used for some of the purposes already indicated.

Having now some conception of the work to be done, we may appropriately proceed to inquire into the organisation by whose aid it is performed. The greater part of the water supply is derived from the river, and the pumping station is situated on the left bank of the Seine, near the Champ de Mars railway station. The building measures 165 ft. long, 50 ft. wide, and 165 ft. to the top of the central dome. Its equipment includes four Worthington triple-expansion pumping engines, capable of raising 1,440,000 gallons per hour. These engines are of the duplex type, with Worthington compensators, and are fitted with Corliss valve gear. They work at a steam pressure of 140 lbs., and the consumption is stated to be 13 lbs. per i.-h.-p. per hour. In addition to the pumping engines a Laval steam turbine and dynamos are provided to generate current for 1,400 incandescent lamps by which the building is lighted, and this turbine is fitted with a Worthington jet condenser. Worthington pumps are also used for working a lift conveying visitors to the dome. The whole of this plant has been installed by the Société Française des Pompes Worthington.

Water is taken from the pumping-station in two 30-in. mains, to an immense reservoir constructed behind the façade of the Château d'Eau, at a height of about 115 ft. The cascade supplied by this reservoir falls from a height of nearly 100 ft., and is 32 ft. 9 in. wide. As high pressure is necessary for the great fountains, a separate supply, at the rate of 237,000 gallons per hour, is furnished from the municipal reservoir on the plateau of Villejuif.

From the basin at the foot of the cascade water is conveyed at low pressure to the boiler-houses and machinery galleries. All the distributing mains for water and steam, as also the pipes returning hot water to the river, are laid in subways extending along three sides of the Champ de Mars. These subways differ somewhat in dimensions, but in general construction they are more or less alike, having a horseshoe section, with walls 14 in. in thickness. The total length of the three subways is about 4,850 ft., their separate lengths and internal dimensions being approximately as follows: (1) 1,750 ft. long, 8 ft. 6 in. wide, by 8 ft. 10¾ in. high; (2) 2,410 ft. long, 7 ft. 10½ in. wide, by 8 ft. 6 in. high; (3) 690 ft. long, 6 ft. 6½ in. wide, by 8 ft. 6 in. high. At certain points where the tunnels meet access chambers have been formed measuring 14 ft. 9 in. square by 13 ft. high, and in these supplies of fittings are kept in readiness for repairs. Ventilation is effected by two cement-built ducts 9 ft. square, rising through each of the boiler-houses.

Taking one of the subways to illustrate the arrangement of the mains, we find in the lower portion one cold and one hot water pipe, each of 23¾ in. internal diameter, resting on masonry supports; outside these are two lines of steam pipes of nearly 10 in. internal diameter; and two more steam pipes are suspended by hangers caulked into the arched top of the subway. Branches from the main tunnels communicate with covered trenches in the machinery galleries, the trenches being lined internally with wood, and measuring 3 ft. 3 in. high by 2 ft. 7½ in. wide. Contained within each of the latter conduits are three branch pipes, two of about 10 in. diameter, conveying water to and from the engine condensers, and one of 6 in. diameter serving the engines with steam. The whole system of pipes is suitably controlled by valves, some in the subways and others in the trenches, but the responsible officials do not appear to be so well acquainted as they ought to be with the exact working details of the scheme. On one or two recent occasions, whilst inconvenient escapes of steam were in progress, it was extremely difficult for exhibitors to find any one who knew which was the proper valve to shut off the section where the leakage had developed.

If it were useful in no other way, the Exhibition of 1900 would be valuable as an

object-lesson of the prodigious waste inevitably attending the use of coal and steam for the development of energy. So much is heard of modern achievements in mechanical science that one is apt to forget the disadvantages of the steam-engine, for which, however, no one can at present suggest an efficient substitute. Taking some of the figures already quoted, and using round numbers for the sake of simplicity, we find the coal consumption at Paris to be at the rate of 30 tons per hour, the theoretical value of which is about 870 million heat units per hour. But the consumption of steam is estimated at 440,000 lbs. weight, and taking the original water temperature at 50 deg. Fahr., this is equivalent to rather less than 500 million heat units. Consequently nearly four-ninths of the calorific value of the coal is lost in the boiler-houses and pipes. As for the engines, it is common knowledge that the proportion of steam theoretically convertible into mechanical effort can in no case exceed 26·2 per cent. It is, therefore, a liberal assumption to take the practical efficiency in the present case as 20 per cent. Then, out of the 500 million thermal units contained in the steam supply, only about 100 millions are utilised. All the rest of the heat is absolutely wasted, the greater portion being carried into the river by water from the condensers. Finally, we find that of the original 30 tons less than 3½ tons become actually utilised in the production of mechanical energy.

Amongst other examples of administrative engineering the Eiffel Tower lifts are worthy of remark. There are now two lifts installed by the Compagnie de Fives-Lille, in addition to the Otis elevator and the Edoux lift, and the joint capacity of these appliances is 62,000 passengers per hour. The Fives-Lille lifts are placed in the south-west pier of the tower, and are arranged to work independently. Each car is divided into two compartments, one over the other, and the floors are maintained in a horizontal position by means of suitable mechanism. In each instance the cars run on the rails previously existing, but additional steel runners have been provided, in which racks are cut, and upon these hydraulic safety clutches will act in the event of any failure in the other mechanism. Each car is suspended by six steel cables working over pulleys about 13 ft. diameter fixed on the second stage, and passing under another series connected with and actuated by the hydraulic rams on the ground level. A group of sixteen Worthington pumps is used for operating the hydraulic plant for the whole of the lifts. Two accumulators working at 2,200 lbs. pressure serve to operate the hydraulic rams, the pistons of which are 15¾ in. diameter, with a stroke of 55 ft. 9 in. The energy furnished by the descent of the cars is utilised by the discharge of water into an accumulator working at 294 lbs. pressure. Energy equal to more than 438 h.-p. can be stored in the two high-pressure accumulators.

In several of the Exhibition buildings the visitor will find convenient, if relatively expensive, means of ascending to the upper floors in the "Rampes mobiles." A few of these conveyors were installed by the Reno Elevator Company, but by far the greater proportion are of the "system Hallé" constructed by MM. A. Piat et ses fils, of Paris. The endless band forming the footway runs round two large pulleys and upon boxwood rollers; the upper pulley-shaft carries gear, operated by an electric motor by Sautter, Harlé, et Cie. The handrails are supposed to travel at the same rate as the footway, but in one or two instances we discovered a slight excess of speed on the part of the handrails.

Mechanical ventilation in connexion with the Salle des Fêtes is effected by several Leroy fans about 12 ft. diameter, driven by belting from electric motors, and the two Palaces of Agriculture and Aliments are supplied with air by fans made by MM. E. Fargot fils, of Paris. There are some similar appliances scattered about in other parts of the Exhibition, but not nearly enough. In the agricultural section, which is supposed to be ventilated, the climate is particularly oppressive, and its tropical character is in great measure due to the absence of awnings to intercept the rays of the sun.

Besides the services we have already mentioned, there is a very extensive system of drainage over the whole of the Exhibition area.

NOTES.

The Monument to Ruskin.

THE opposition that has been raised to the proposed monument to Ruskin in Westminster Abbey, in some letters which have appeared in the *Times*, is a foolish and unreasonable one. The occasion seems to have been laid hold of by some of those hypercritical people who are always detecting irreverence to ancient buildings where rational persons can see no reason for such a charge, for a special objection fortified by a reference to expressions used by Ruskin himself, the real intent of which seems to have been misrepresented. Mr. Cook's reference, in Saturday's *Times*, to Ruskin's refusal to subscribe to a bust of F. D. Maurice in the Abbey, makes it quite clear that Ruskin had no rooted objection to the placing of such memorials in the Abbey, otherwise he would certainly have taken the opportunity to give expression to it. He objected—and quite rightly—that Maurice was not a man of sufficient calibre to claim the honour of special commemoration in the Abbey, and his objection seems to have gone no further than that. Though we think Ruskin a man much overrated in many ways, he has a far better right to a memorial in Westminster Abbey than some of those who have obtained it, and the opponents of the proposal have failed to show any reason for thinking that he would himself have objected to it. The Committee concerned about the memorial is not one which is likely to sanction anything that would be in any sense an injury to the Abbey.

Recent Changes at the Tower.

IN the spring of last year was pulled down the old guard-house which had been built in 1827 to replace the "Stone Kitchen" as fitted up in the Stone House—formerly the Spanish Armoury—lying between Coldharbour and Wakefield (or Hall) Towers, in the latter of which the regalia is now kept. Northwards from Wakefield Tower extended a curtain wall, since embodied in the Stone House, and against its outer or western side was built a row of gabled and bow-windowed houses, with red brick chimneys and tiled roofs, the "Seven Houses of Office" cited in the survey of 1532 as being then newly built, and pulled down in 1827. For the incongruous design of the new guard-house, built by Messrs. J. & M. Patrick, of Wandsworth, upon the same site, the War Office authorities are responsible. Constructed of light terra-cotta coloured bricks with stone dressings, and having gables upon its lofty western front, the new structure is utterly out of keeping with the adjacent buildings, and, moreover, quite obstructs the view of the White Tower from the south-west. We are not surprised that even the Office of Works are prompt to repudiate any share in its design or erection. The new guard-house contains quarters for the main guard, school-rooms, sergeants' mess-room, quarter-master's stores, recreation rooms, and offices. We understand that measures were taken to preserve the well, 90 ft. deep and about 5 ft. in diameter, which, together with the base of the curtain wall, was discovered in clearing the site. The twelfth-century masonry of the well was of rubble, steined down to 15 ft. below the water level with Gatton ashlar—a firestone that was largely used for a dressing of the Kentish rag in the older portions of the Tower. The curtain wall appeared to be a contemporary piece of masonry. The Office of Works have lately repaired the roofs and exterior walls of the Lieutenant's Lodgings and other half-timbered houses on the south and west sides of the Inner Ward, standing upon the curtain walls which join the Beauchamp, Bell, and Garden (or "Bloody") Towers. They have also refaced portions of the outside of the Garden Tower, after removing the cement and embedded flints and many decayed stones, and have replaced the oaken door in the doorway, latterly blocked up, which opened from "Raleigh's Walk" into the upper room wherein, it is believed, the two young Princes, Edward V. and the Duke of York, were smothered to death; the adjoining room is that in which the portcullis was worked. "Raleigh's Walk," along the retaining wall, leads to the Lieutenant's quarters, and, together with the leaded roof of the Garden Tower, formed an exercising ground for the prisoners—Cranmer, Ridley, Sir Walter Raleigh, Colonel Hutchinson, and Thistlewood amongst them, who were confined in the Garden Tower.

Old Westminster and Thorn-eye.

IN preparing for the foundations of the new Government offices on the Parliament-street site a stratum of fine yellow sand, resting on gravel, about 30 ft. below the present roadways, has been laid bare, and a powerful pump is kept constantly at work to prevent flooding. Above the sand lies a thick stratum of a dark green peat-like compound of loam, sand, and vegetable matter, the deposit of flowing or running water in the wide marshy lagoon through which ran the Thames, below the sand, which is 10 ft. deep, is a stratum of gravel at a depth of 30 ft., which will be cleared for laying a bed of concrete, 6 ft. deep, for the foundations. The excavations should prove of great interest to students of the geological history of the site of London, and the strata should be compared with those shown in the model of the "London Basin" at the Museum of Practical Geology in Jermyn-street. For they can see, in Parliament-street, ample vestiges of a portion of the ancient Bulunga fen on which nearly all Pimlico, Belgravia, and Westminster now stand. The Abbey was built upon the island of bramble and thorn that arose out of the

surrounding marshes and pools watered by the tidal overflow from the Thames and by effluents of the Tybourne, and formed a refuge for the primæval wild ox, elk, and red deer. It is the "locus terribilis," the awful or venerable, rather than terrible, place, so named in the charter of Offa of Mercia, A.D. 785, to the Benedictine monks of St. Peter's Monastery, and in Edgar's charter to Dunstan which delimits the manor, the original parish of St. Margaret, that he bestowed upon the Abbey at its refoundation nearly two hundred years afterwards.

Glasgow School of Art.

FROM the prospectus and prize scheme of the Glasgow School of Art we learn that the new session commenced on Thursday. The School has just erected new buildings in Renfrew-street, which were opened in December last; and though the scheme is not complete, the foundations have been laid for the remaining third of the work. The subjects taught at the School include architecture, modelling, design and decorative art, &c. A museum of casts contains examples of figure and ornament from the Classic, the Gothic, the Renaissance, and later styles, and there is a library containing over 1,400 volumes of works on architecture, &c. The architectural tuition of the School aims at (1) the preparation of students for an architectural career; (2) supplementing the office training of the pupil and assistant; (3) imparting an appreciation and knowledge of architectural form to painters, sculptors, and workers in the decorative arts. Exclusive of preparatory studies, the course extends over four years, provided that the full time of the student is employed. The instruction given meets the requirements of the examinations for the membership of the Royal Institute of British Architects, but, in addition to the subjects included in that scheme, the School course provides also for the study of nature and from life. The Architectural curriculum is divided into—I. Probationary course. II. Intermediate course (in two divisions). III. Final course (in two divisions). Mr. Alex M'Gibbon, A.R.I.B.A., is the Director in Architecture, assisted by Messrs. W. R. Watson, J. Smith, E. Brady, and the Architect Visitors.

Commons and Footpaths Preservation Society.

THE Report for 1899-1900 of the Kent and Surrey Committee of this Society deals with the useful work of the Committee in its efforts to maintain public rights in the counties of Kent and Surrey. The Committee has been called upon to deal with over eighty cases involving the preservation of common land, rights-of-way, roadside wastes, and open spaces in various parts of the two counties. A considerable proportion of these cases have been brought to a successful issue, sometimes wholly through the Committee's exertions, and at others mainly through its influence and advice, while a number of Parish and District Councils have consulted the Committee and have received information upon which they have acted. During the year a new centre has been formed for the parishes of Chelsfield, Down, Cudham, Farnborough, Orpington, and Halstead, and efforts are being made to organise centres in other parts of Kent and Surrey. The Committee raised 1,020*l.* towards the scheme for the extension of Brockwell Park, and it is helping the promoters of other open-space schemes. In order effectually to carry on its work the Committee desires:—(*a*) To enrol as many residents in Kent and Surrey as possible as members of the Society, who will each pay an annual subscription. (*b*) To enlist the services of riders or pedestrians who know any parts of the counties well, who will mark on sheets of the Ordnance map, supplied by the Committee, the footpaths now open to the public, the roadside strips still unenclosed, and the commons. (*c*) To enrol in many parts of the counties corresponding members who will be prepared to allow the secretary to ask them to obtain for him any information he may need in their neighbourhood, should questions arise as to enclosure of open land or obstruction of paths. (*d*) To establish in all urban centres in Kent and Surrey local committees, to whom any cases sent direct to the Committee for advice and assistance may be referred.

Sanitary State of Pontypridd.

DR. L. W. DARRA MAIR'S Report to the Local Government Board on the fatal prevalence of diphtheria in the Pontypridd Urban District, while it does not trace the disease to any special defects in the sanitation of the district, shows that there are serious defects which ought to be remedied. The district has an area of 2,560 acres, and a population, estimated at the middle of 1899, of 38,900, living in some 6,000 houses. The average number of persons per house is computed at about six and a half. The population of the Pontypridd Urban District is made up almost entirely of members of the working class, who are engaged almost exclusively in coal mining, as in the adjoining Rhondda district. The majority of the dwellings in the district are of recent construction, and houses are, as a rule, built of local stone. Many of the houses appear to be well built and well arranged in streets of adequate width, but some of the old houses in Pontypridd itself are "back to back." Water is supplied to the district by the Pontypridd Water Company, but the supply is said to be inadequate in summer. The District Council have spent 40,000*l.* on the construction of sewers over and above their contribution to the joint sewerage scheme. There are still several houses in each ward unconnected with sewers, and steps are now being taken by the District Council to deal with them. House refuse is disposed of in large heaps in various places. "I saw one enormous accumulation in the Rhondda Ward in the midst of a large number of houses." The sanitary staff consists of the Medical Officer of Health, who is actively engaged in practice in the district, and two inspectors of nuisances. The preventive measures adopted in the district appear to be inadequate. For instance, there is no isolation hospital, and disinfection of infected houses is carried out in but few cases. The Report mentions the advice given in the matter to the Local Authorities by Dr. Darra Mair, which is very much to the point, and the Urban District Council will do well to take advantage of it.

Acetylene *versus* Coal-gas.

IN our last issue we published a letter from Mr. Chas. Bingham relating to the relative values of acetylene and coal-gas for illuminating purposes. Our correspondent objected to our statement that the claim that acetylene gives a light fifteen times greater than that yielded by coal-gas is misleading, and then endeavoured to prove that the claim was not exaggerated by reference to figures published by Professor Vivian Lewes. In London the standard illuminating value of the public gas supply is sixteen candles for gas burned in an Argand burner at a rate of 5 cubic feet per hour, but our correspondent for obvious reasons prefers to take flat flames possessing a much lower light efficiency as his basis of comparison, while for comparison of the incandescent gas-light with acetylene he compares the relative values of the light thrown down at an angle of 60 deg. In fact, Mr. Bingham takes for his basis of comparison the efficiency commonly obtained from coal-gas, instead of the efficiency which it is possible to obtain from coal-gas. The average gas consumer by placing his burners in wrong positions, and by using faulty burners, loses more than half the light efficiency of the gas he consumes. A common flat-flame burner frequently yields a satisfactory flame when first used, but before it has been in use six months has become dirty, and yields a flame of miserable appearance and small light efficiency. In few cases does the consumer then invest in a new penny burner, but probably spends his penny in writing to the Local Authority to complain that the gas supply is much worse than it was a few months previously. For this, of course, the gas manufacturer is more to blame than the consumer, since it is the business of the former to have a knowledge of all things appertaining to the use of gas, and to assist his customer to utilise to the greatest advantage the article sold. The figures quoted by our correspondent are worth careful perusal, as they clearly demonstrate the absurdity of placing incandescent mantles upon overhead pendants (especially when reflectors are not employed), and that "gasfitting" in general requires more careful attention than it usually receives. With regard to our correspondent's observations regarding the unsatisfactory quality of the carbide now on the market, we may add that similar complaints have reached us from other sources, and that it is commonly remarked that the carbide now sold is worse than that manufactured three or four years ago. As, however, the Acetylene Illuminating Company* guarantee a regular supply of carbide which will yield an average of 5 cubic feet of gas per lb., users of acetylene should obtain a written contract from the firm they patronise agreeing to a suitable reduction in price for all carbide supplied which is found to be of inferior quality.

South Shields Municipal Buildings Competition.

THE instructions to architects for the competition for new municipal buildings at South Shields include some provisions which are not at all satisfactory, and which ought to receive the attention of the Competitions Committee of the Institute. In the first place, the competition plans are to be to ⅛-in. scale, which is a working-drawing scale, and architects ought not to be put to the trouble and expense of making drawings to so large a scale for the mere chances of a competition, as the essential qualities of

* See the *Builder*, August 4, p. 96.

a design can be perfectly well appreciated on a smaller scale. Then it appears that if the successful architect is employed to carry out the building, he will have to pay his own travelling expenses; an utterly improper tax on him, which no one would think of making in the case of any other profession, and which is directly against the recognised scale of charges of the Institute of Architects. The same clause (19) in which this is mentioned also contains a rather vague statement as to furnishing to the Corporation "copies of all subsequent drawings, elevations, details, and sections of the building which may be found necessary." As "detail drawings and superintendence" are already included in a previous sentence, this appears to mean that the Corporation have power to order additional copies of all working and detail drawings to be made for their own use. This may not be the intention, but it reads so, and at any rate calls for explanation. It is to be regretted also that the instructions include the requirement of a perspective view—an extra piece of trouble and expense to competing architects which has long ago been condemned by competent judges as not only useless but often mischievous in a competition, as affording a means of cooking up an effect which the actual building would not realise.

DISCOVERIES AT THE PRIORY CHURCH OF ST. JOHN OF JERUSALEM, CLERKENWELL.

IN our number of October 13, 1894, we published a drawing and description by Mr. W. Monk of the Norman and Transitional crypt of the present Church of St. John the Baptist, Clerkenwell. In May of that year a faculty had been granted by the Consistory Court for the removal of the remains of about 325 bodies to Woking. In April last a similar faculty was issued for making some alterations in the cleared crypt, to include the laying of the floor with tiles, a dais for an altar at the east end, and other repairs, at an estimated cost of 1,400*l.*, towards which sum the Ecclesiastical Commissioners contribute 400*l.* out of the City Parochial Charities Fund. We have taken an opportunity of visiting the works, which are being executed under the superintendence of Mr. John Oldrid Scott, F.S.A., who in 1887 made an extensive repair of the church, re-erected in 1721-3 on the site of the choir of the Hospitaller's Church through the instrumentality of Gibson, Bishop of London, being the second of the "fifty churches" in order of consecration. The crypt's east end, through which it was entered from the disused churchyard, is now built up, and a range of steps has been built at the west end leading down to a doorway made in the wall at that end of the crypt's middle aisle. Thus the crypt will now be dependent upon lighting by artificial means, as all the side windows have gradually become blocked in during many years past. Some drain-pipes which carried rain-water from the roof of the church are taken away from its interior.

In excavating the ground for a new entrance into the crypt have been found a flight of stone steps leading to an archway in the west wall, and portions—as there appears to be very little doubt they are—of the original "round" of the Hospitallers' Church, which, on March 6, 1185, was consecrated by Heraclius, Patriarch of Jerusalem, who, some days before, had consecrated the Templars' new church of St. Mary. The latter remains are carefully built up on either side of the new doorway. They consist of two fragments of masonry, circular on plan, which, if completed, would form a round wall of, say, from 65 ft. to 70 ft. internal diameter. The interior diameter of the Temple Church is 58 ft.; we saw no trace of a wall arcade resting upon a continuous sedile or table, as there is at the Temple. On the splayed plinth course, 6 in. high, rests a walling of from three to four courses of ashlar finely dressed, constructed of Reigate or a similar stone, and bearing mason's marks perfectly preserved. The ashlar and its backing of rubble are nearly 4 ft. thick. The dressed stone and backing rest upon a very hard mass of concrete embedding rubble, flag-stones, pebbles, and so on. Just outside the curve of the fragment to the right hand of one descending the steps into the crypt has been uncovered what is taken to be a portion of a buttress of the original south aisle of the choir. The floor of the "round" church would lie 8 ft. 4 in. above the existing floor of the crypt, which was entered through a door whose jamb remains *in situ* at the north-west angle of the crypt. In the crypt's north aisle, where the vaults for the most part and the north wall are of brick, coarsely worked, are now arranged a large store of carved and moulded stones, some bearing traces of colour, as relics of the fabric. The western retaining wall of the steps stands over the foundations, in two lines about 22 ft. asunder, of, it seems, the piers of the nave, standing over the "round" and extending into the now open space of St. John's-square. On the west side of the east bay of the crypt's north aisle is a trefoil-headed doorway, retaining the large iron eyes.

Wat Tyler's rioters destroyed the earlier church, the crypt excepted, in 1381; the conflagration of the Priory buildings lasted seven days. The second church, which had nave, aisles, choir, choir-aisles, side-chapels, and the bell-tower described by Stow, was completed in 1504, *temp.* Prior Docwra. But the greater part of the later church was destroyed with gunpowder by Somerset, who coveted the materials for his projected riverside palace by the Strand. Then Cardinal Pole restored the ruined choir, and set up Sir Thomas Tresham, of Rushton, as prior in 1557. After the abolition of the English religious order (since revived, with a difference, at St. John's Gate) in 1559 by Queen Elizabeth, the property passed from John Dudley, Lord Lisle, to Ralph Freeman, *temp.* James I.; then from William Cecil, second Earl of Exeter, to his daughter Diana, who married for her first husband Henry Vere, Earl of Oxford, and for her second husband Robert Bruce, second Earl of Elgin, who for his active promotion of the Restoration was created, on March 18, 1664, Earl of Ailesbury in the peerage of England. Lord Ailesbury occupied the house which is depicted at the north in Hollar's two views (1661), from the west and from the east sides of the priory church; his successor lived there until 1706, using the choir as his private chapel. The chapel, having been converted into a Presbyterian meeting-house, was sacked by the mob during the Sacheverel riots: Bishop Burnet, who lived opposite, mentions its pillage. It was then bought, with the remains of the Preceptory, by Simon Michell, who built Aylesbury-street, Red Lion-street, and other streets in the neighbourhood. Michell restored the fabric, built a new roof and west front, and sold it to the Fifty New Churches Commissioners for 3,000*l.*, less 50*l.* in consideration of a vault in the crypt, 1723, and the church was reopened for divine service on Thursday, December 27, that year.

COMPETITIONS.

BOARD SCHOOL, WISHAW.—The plans by Mr. James Cowie, of Wishaw, have been accepted in a competition for designs for a new Board school at Wishaw. The school will be built on a site off Alexander-street. It will be a one-story building, and will accommodate 518 scholars.

WESLEYAN CHURCH, SUNDERLAND.—In the competition for the proposed new Wesleyan church, Holly House, Durham-road, Sunderland, the first premium has been awarded to Mr. J. Jameson Green, 19, South John-street, Liverpool, who has since been appointed architect for the new church; and the second premium to Mr. Fredk. Boreham, A.R.I.B.A., 75, Finsbury-pavement, London, E.C. There were nineteen competitors in all.

THE CHURCH CRAFTS LEAGUE.—A leaflet has been issued by the League giving an account of its objects and methods. At the recent half-yearly meeting, held under the presidency of the Bishop of Rochester, Mr. Anning Bell and Mr. Mouat Loudan, decorative artists, and Mr. Harrison Townsend and Mr. Leonard Stokes, architects, were elected as Artist Members. Membership of the League is open to ordinary members on payment of a small annual subscription. Those desirous of further particulars should write to the Secretary of the League, at the Church House, Westminster, S.W.

MEREWORTH CASTLE AND CHURCH.

ON the 18th ult. some members of the Architectural Association visited Mereworth Castle and Church, near Wateringbury, Kent.

When Colin Campbell, the industrious editor of the first three volumes of the "Vitruvius Britannicus," decided about the year 1723 to translate the Villa Rotunda, by Palladio, from Italy into England, he must have felt that the most difficult part of the undertaking would be to find conditions and a site that would justify such an exceptional scheme for a house. The well-known description of the villa as "the last word of temple architecture applied to a house" hardly accounts for the whole idea of the original, because, beside the attraction of combining the points of a circular and a rectangular temple in one design, there was a special suitability in this conception by Palladio of a four-square suburban casino for a site on a prominent knoll just outside the walls of Vicenza, each portico to command a view and a possible approach, while the domed circular saloon provided a centre point and a cool place of retreat from the summer heat of the Italian climate.

Mereworth Castle, however, is, as it were, astride an avenue; the side porticoes are deprived of their steps and have always been unapproachable, all the more because of the moat that formerly surrounded it. Thus the front and rear flights of steps, widespread out and arched across the water, have a prominence that suggests a way through, an intermediate rather than a final point of rest, as the idea of the design.

The exigencies, moreover, of the all the year round occupation of an English country seat, led to the isolation of the central saloon from the porticoes that would otherwise lead into it. The centrality of the plan is consequently destroyed, three of the four vestibules of the original scheme being swallowed up in the surrounding rooms.

Incidentally, and as by force of tradition, a fine gallery 82 ft. by 20 ft. by 22 ft. 6 in. high is obtained, occupying the full length of the rear façade. This room has a cove sprung at two-thirds the height of the walls, and having an opening into a portico 47 ft. wide, as on to a raised terrace, forms an admirable reception-room. The circular saloon, however, in spite of its 35 ft. of diameter, with a height of no less than 60 ft. to the crown of its dome, makes a very inadequate substitute for the traditional hall. The suggestion of cross traffic is, perhaps, responsible for the sense of smallness relatively to the known dimensions. In itself this saloon is a success, even unexpectedly so in its lighting, for from the drawings one would hardly expect that four bull-eyes, 4 ft. 6 in. in diameter, placed at half the height of the dome, would so fully light an apartment on this scale. The intersections of the dome over these lights are cleverly managed, but at the cost of the effect of the spherical form; a ceiling rather than a dome resulting. The single eye of the original could not easily have been obtained in this case, owing to the exigencies of the English fireplace, all the flues of the house being drawn over the inner dome to a central lantern, treated in the usual Renaissance manner. This solution of the great chimney question has not, however, been carried through, in reality, with all the apparent ease of Campbell's drawings, as where he shows a small attic stage under the lantern cupola, is, in fact, a gaping void, necessary for the emission of the smoke, which curls out from under what might be irreverently described as a copper umbrella.

Of service conveniences it is naturally idle to speak; there are two circular stairs each of about 3 ft. 6 in. clear way, and, as for their light, they depend mainly upon unglazed openings into the central saloon, they are, in more ways than one, traps for the unwary.

The best bedrooms, placed over the great gallery, have interestingly treated alcoves for the beds, with side closets in the Continental fashion. The bed space is cross-elliptically vaulted with enriched mitres, the façade to the rooms having Ionic pilasters with an entablature from which the segmental arch of the central opening is sprung. The sash windows in these rooms are curious in their arrangement, as being square, the difficulty of that type has been met by a scheme of sliding the single sash into a cavity in the wall overhead. Campbell's evident indifference to points of scale is betrayed in such

details as the clumsy divisions of his sash-bars. The change of fashion in fireplace arrangement, that all architects know so well, is amusingly illustrated in these bedrooms, for the low prominent fireplace breasts of those days, when walls were thick and could hide their own flues, had some time in this century been made out above, and carried up with the ceiling cornice returned round them, as though they were the chimney breasts of a thin-walled modern villa. The owner has pleasingly restored one of these rooms to its former state.

In internal finishings, wood and stucco are much in evidence; the central saloon, with walls of a cool green, has all the ornamental plaster-work of a type verging on the bold exuberance of the Italian original, in white; while the doors are of a rich mahogany, set in white door-cases with occasional gilded enrichment. The floor was unfortunately tiled some thirty years ago, but the original plain terrazzo mosaic floors remain in some of the surrounding rooms. In the latter the painted ceilings are more ambitious than successful, but here, as at Stowe, the original gilded enrichment is marvellously fresh; nothing more is required or has been used than soap and water washing to restore its effect.

It cannot be pretended that Campbell had much idea of refinement in detail; the work compares unfavourably with even the average internal work of that age, while of his sense of proportion the inadequacy of his porticoes is a standing condemnation. With an order of 2½ ft. diameter, of a height of 21 ft. in the column alone, standing on a basement 16 ft. in height, some effect in a hexastyle portico might clearly be expected. The attic story, however, of the main building, equal in height to half the column, deprives the portico of its dignity, more especially as above the visible roof is hipped all ways, to a square, on to which the lead dome, of a diameter about equal to the width of the portico, appears placed without any thought of the connexion of parts, or idea of growth, that the combination of such features demanded. It is most instructive to compare this mixture of motives with the simplicity of Palladio's design. There the portico reigns supreme; the saloon dome is discreetly visible under its rough tile roofing, free from any lump of a lantern, like that in Campbell's version, while the mass of the composition, a square relieved by advanced porticoes crowning a knoll, satisfies the eye of itself. At Mereworth two secondary blocks, placed beyond the former moat, on the lower level of the ground at either side of the main avenue, save the situation, and redeem the heaviness of the house itself, by making it the centre of a group.

These subsidiary blocks are later additions. Treated with a bold Doric order, they contrast the Ionic of the main building, while the scale is such that the metopes are utilised as entresol windows. The wings and advanced features are carried on bold arches that help to carry out the idea that these are office buildings subsidiary to the mansion beyond. There is a cross connexion by a wide footway, well paved in stone slabs of two colours, running past the great flight of steps up to the main portico—an idea pleasant in itself, but rendering still more impossible, in a damp climate, the approach to the house, as the drive is cut off even from the foot of the staircase that must in any case be ascended in the open.

About a mile from the house is the Parish Church, built at the same period, and presumably also Campbell's work. At all events, it illustrates the same mania for reproducing other people's designs under different conditions. In this case it is Inigo Jones' Church of St. Paul's, Covent Garden, with a tower and steeple after Gibbs' ideas planted on to it, that is caricatured. The special feature of the original, the Tuscan Portico, is here replaced by an open semi-circle of columns carrying round the characteristic eaves, widely projected on cantilevers in the fashion that distinguishes the celebrated barn. A kind of flat is thus formed over this semi-circular portico; while above, the main roof, brought over to the same extent as the eaves, makes a pediment. The combination, needless to say, is a hopeless one, the semi-circular portico being far too large in scale to be a subordinate feature, while at the same time it is not frankly accepted as the end elevation of the church. It happens, therefore, that the east end with its flat wall surface, surmounted by the uninterrupted widespread pediment, is far more successful. The church is built in rough rag stone, two courses to the height of the single blocks of rustication at the angles, which are in dressed stone of a yellowish white colour, contrasting the slate grey walling. The windows are plain openings, with rusticated key blocks to their flat heads. The base of the tower forms a circular vestibule, reached from the portico, and contains two winding stairs of moulded spandrel steps cut out of the solid timber. Inside, the nave, 23 ft. 3 in. clear span, is barrel vaulted on to a Tuscan order, 2 ft. 3 in. diameter, set 6 ft. 3 in. apart, in seven bays, from the tower to the east wall. The aisle bays are similar squares, an engaged column being set against the side walls, and the architrave of the entablature is carried round to a flat ceiling, each bay having, in sham painted relief, a large rosette. The nave vault is painted in false coffering, the order is marbled, and the triglyphs are imaginary. The end walls of the nave are in the three intercolumniations, the entablature is returned across, the eastern spandrel to the vault being filled with a large lunette. It has been contemplated to add a chancel, possibly in the form of a circle retaining the existing intermediate columns, but it would seem to be a better idea to return the aisle across the nave with a semicircular apse beyond, which would give the required amount of space with the least interference with the original scheme, and would obviate certain difficulties of Classical detail that would otherwise arise. Fortunately the day is passing when a church in this style could *not* be adapted to modern uses without being recast in a mediæval manner; and somewhat unfamiliar as this city church in a country-side may appear to English ideas, it is a legacy from a generation that took pleasure in erecting it.

The Architectural Association are indebted to Viscount Falmouth for allowing them to visit Mereworth Castle, and for much kindness on the part of his family and himself in entertaining the party, while at the church the vicar kindly explained all the points of interest.

BOARD SCHOOLS, SPARKHILL, BIRMINGHAM.—On the 27th ult. the new schools erected by the Yardley School Board at the foot of College-road, Sparkhill, were opened. The building, which is of red brick, with buff terra-cotta facings, and will cost between 13,000*l.* and 14,000*l.*, is situated on a triangular piece of land, and is divided into three main halls, provision being made for 360 boys, 360 girls, and 410 infants. Five classrooms each have been provided for the boys' and girls' sections, provision having been made for two additional rooms in each of these departments in the future, while six classrooms, to accommodate sixty children each, are connected with the infants' schools. The classrooms are 24 ft. by 24 ft. each, and two of the main halls 68 ft. by 30 ft., and the third hall 48 ft. by 30 ft., while the corridors are each 6 ft. wide. The school flooring is of wood blocks, and that of the corridors and playgrounds of asphalt. There is a cookery centre to accommodate fifty or sixty pupils. Haden's low-pressure system has been adopted for heating purposes. The buildings include a caretaker's house. Mr. R. F. Matthews, of Birmingham, was the architect. Messrs. Harley & Sons, of Smethwick, were the builders.

STABLE NEAR GUILDFORD FOR J.STURGIS ESQ. C.F.A. VOYSEY ARCT

SKETCH OF STABLE NEAR GUILDFORD.

THIS little sketch, done some time ago, is a record of some stables near Guildford, designed by Mr. C. F. A. Voysey in the style so peculiarly his own.

ST. PAUL'S IN 1666.

FROM A CORRESPONDENT.

THE controversy about St. Paul's is no new thing. It raged as violently in the seventeenth century as it is raging now at the end of the nineteenth. The prophesy of Haggai about the second temple, "In this place will I give peace," has not proved true of our national Zion, which arose Phœnix-like from the ashes of its predecessor.

In Evelyn's "Diary," under the date of June 27, 1666, we find this entry:—

"I went to St. Paule's Church, where, with Dr Wren, Mr. Prat, Mr. May, Mr. Thos. Chichley, Mr. Slingsby, the Bishop of London, the Deane of St. Paule's, and several expert workmen, we went about to survey the generall decays of that ancient and venerable church. . . . When we came to the steeple it was deliberated whether it were not well enough to repaire it only on its old foundation, with reservation to the 4 Pillars; this Mr. Chichley and Mr. Prat were also for, but we totally rejected it and persisted that it required a new foundation, not only in reguard of the necessitie but for that the shape of what stood was very mean and we had a mind to build it with a noble cupola, a forme of church building not as yet known in England but of wonderful grace."

A curious confirmation of Evelyn's statement has lately come to light in the papers of the above-named Mr., afterwards Sir, Roger Pratt (1620-1684), of Ryston, the architect of the famous Clarendon House and the associate of Wren in planning the rebuilding of London after the Great Fire, which appointment he tells us of in his own quaint language.

"His Majesty King Charles II. was pleased out of his owne merre motion to appoint his Surveyour for ye present Mr. Hugh May, Doctor Renne, and myselfe to be his Commissioners to treate with such as ye citty should think fit to nominate about ye more quick and orderly re-edification of the citty, who sente to us Mr. Milles and Mr. Hooker, Professor of ye Mathematics in Gresham Colledge, and Mr. Germain, an experienced man in buildings."

We find that the salary asked by the Surveyours was 12d. per hour "wherewith ye citty most readily complyed," too readily perhaps, for though it is afterwards raised to 18d. a message is sent by Mr. Pratt to the city "that they would bee pleased to raise ye 18d. formerly layed by them upon each houre to 2sh.-6d. beeing yt ye surveyours have refused to undertake it at soe low a rate."

The surveyors seem to have been suspicious of the good faith or the ability of the "citty" to pay these usurious demands, for we find a request that "they (the citty) would now think fitt to appoint some person or persons to covenant with ye surveyours . . . soe they might be assured of theire pay." What would a modern Clerk of Works say to these fees?

Mr. Pratt's services, however badly paid for by "the city," are recognised by the King, as is seen by this entry :—"Fees for my knighthood 69*l*." This is highly creditable to Charles, for the new-made knight, although not afraid to stay in London during the Plague, had not been an active supporter of his father. He candidly tells us :—

"In this very nick of time comes on this Civill Warre . . . . to avoid wch Storme and give my selfe some convenient Education I went out of England about April, Anno 1643, and continued Travelling in France, Italie, Flanders, Holland, &c., till Aug. 1649, viz., about six yeares and a halfe, at wch time I againe returned after ye ende of ye warre and ye death of ye King."*

But perhaps Charles thought a good architect better than a bad soldier, for a man works best at what he likes, and Sir Roger, as the sequel showed, had profited by his exile and gained "some convenient education." He considered travelling a necessary part of an architect's training, and thus advises people bent on building :—

"First resolve withe yr selfe what house will bee answerable to yr purse, then gett some ingenious gentelman who hath seen much of yt kinde abroad and bin somewhat versed in ye best authors of archit., viz., Pallad, Scamozzi, Serlio, etc., to doe it for you, and to give you a designe (wch will generally fall out better than one wch shall be given you by a home-breed architect), for architecture here hath not as yett received those advantages which it hath in other parts it continuing allmost still as rude here as it was at ye verry first."

With this preamble we must now return to Mr. Pratt's views on St. Paul's. As Evelyn notes, they differed from Wren's. We find him, however, willing to concede "the noble cupola," though he objects to the position assigned to it by Wren in his "modell." In "His Queries concerning ye first repaire of St. Paul's Church, London," the good knight tell us :—

"If totally to be repaired, why not then according to its first manner, that being most agreeable to its first composition? but this likewise waved, for yt would have bin too greate an abuse to soe vast an expense to have onely produced a thing soe Gothlike and ungraceful. . . . . If masterly and nobly to bee done what hinte then to be taken either from thinges moderne or antient.

From thinges moderne I thinke yt as then there was noething to be taken either of ye greatnes in any part of Europe except in Rome and I yett doubt whether St. Peter's there, was as then finished, howsoever ye manner yt is soe verry particular yt it could hardly if at all bee brought to suite with such and soe olde a body as our Pauls. Recourse was therefore had to ye reliques of ye most famous buildings of ye antient Greekes and Romans from which all thinges were borrowed, wch seemed best for ye turne.

And truly as to ye divisions of ye side walles from ye steeple to ye portico west, all thinges seemed iuditiously done, ye building first to bee raised with a maine foote from ye plaine, and ye antient Anterides to bee thinned, sett upon a perpendicular, and not with many settings of, as wee see those of olde, to bee made of a convenient breadth (as I suppose of our 3rd or 4th part of ye space between pilastron and pilastron, with ye window placed equally between them, and of about 1½ foote or at most 2, in proiection. The whole worke as to ye rest to bee most nobly composed of most hard stones, ashler revailed of about 2 ft. in depth, 3 in length or better, each one, and if ye higher courses clear ye lower, etc., and fitted with cornishes proportionable to them yt is vast, stronge by its modiglions, and of few members for its greater appearance and layed down securely by ye parapetts upon them, I mean first yt wch concludes ye side isles, and afterwards yt of ye nave of ye building with piedistalls returned and adorned with vast pireoples upon them drawn from ye example of yt formerly standing on ye toppe of moles Adriani in Rome.

The first of these cornishes was taken from yt about ye Court of Marte Vindicatore at Rome, wch doubtlessly would have done much better if it had had either ye on-volo, or golo reverseia, if not both under it, soe as to have seemingly made up a whole cornish, where as now it seems to bee but a part of one and to fall too suddenly, and nakedly to ye upright of ye walls, having noe extended moulding under ye modiglions, whereby to have sweetely brought them of by degrees, and to have bin as it were a common ligature and support to them, ye reason why this was omitted in its first buildings seems to have bin a kinde of neglect of ye court wall and allsoe to save expense and to sett of ye better ye temple standing within wherein was to be shewed ye utmost of skill.

The uppermost cornish seems to bee taken from yt 2nd one of ye Pantheon vide Palladio, lib. 4, page 78, but there ye Modigel have yett a tondine under them, etc., but I thinke ours stands without anything at all, wch for ye reasons above said I conceive ought not to have bin done espetially since it presently falls confusedly into a kind of freeze below of lyons heads and bobbins, for soe I must call them from ye neerest thing yt I know doth anywise resemble them. Concerning this freeze (for soe I must call it or else I know not what to make of it) it seems somewhat to allude to ye Dorich order, where ye bobbins are set for ye triglifes, and ye lyons heads for ye metopes, wch heades indeede are extreemely greate and noble, but as for ye bobins, it is to bee wished yt bee would rather have putt ye triglifes and soe have forborne soe ungraceful an invention for ought yt I have ever seene or readde its without example and yt which lookes yett not well, this freeze stands without any moulding either from ye cornish above or ye supposed architr; beelow, wherein to include it, so yt this falls indistinctly into ye revailed worke of ye walling below, as ye cornish doth into it, wch stands above it.

Soe yt these things beeing mended in ye cornishes as above-said I conceive yt ye whole worke would have stood most nobly, if yt ye lyons heads had bin sett at a convenient distance each from other large festons betweene them and yt ye parapett had either bin distinguished according to art into sollid, and balusters, or if yt this seemed not durable ennough, then to have at ye least ye pannells revailded out and wch perhappes might ye better agree with ye seeming much intended solidiness of ye worke, and to bee of longer duration, except wee had yet rather wholy take away ye freeze afore-said from below and place its ornament heere wch would exceedingly grace ye whole.

As to ye windows the lowermost might have bin more gracefully sett out with balustred stooles, etc., though those now there are well and of great solidinesse and duration, ye architr: about them is well where I suppose all imposts, etc., to have bin omitted (though ye windowes in arco for ye greater strength) to avoid all inconvenience in its future glaceing ye cherubi for its serraglio is new and verry gracefull, and so is its cornish upon seroles with ye spandrells. The 2nd story of rounde windowes with theire archits onely introduce a pleasing noveltie and varietie in ye building, but those uppermost in ye nave seeme to narrow and low and to require yett more ornament than ye architr about them, viz., a noble cornish and frontispeece. . .

February 12, 1672.—The measures of St. Paul's, London, as I finde them sett downe in Dugdall's booke of Paul's, pag. 161, concerning ye truth of ye seale queere.

Breadth.—The whole breadth of ye church from out to out in its maine walleing is about 100 ft. of ye same breadth is ye crosse parte. But beesides this, ye proiection of ye crisme of ye nave and ye crosse part westward is about 2½ or 2 ft., but that of ye anterides of ye quire and eastside of ye cross part is about 10 ft.

Isles.—The side isles of them 20 fts., ye outwalles 5 ft. each, and of 5 ft. ye maine of ye two pilastrons, wch in all doe just make up ye summe of 100 ft.; but ye pilastrons proiecting on each side of theire square 2 ft. ½ for ye carrying up soe many arches several wayes will make these isles 5 ft. lesse then above said between pilastron and pilastron." [Here follow more details.]

Cupolo.—But heere *vide* if yt 4 vast pilastrons might not be raised at ye 4 angles of ye crosse next ye nave, whereupon to sett a *cupolo* of about 100 ft. in diameter, viz., ye breadth of ye whole building mem., yt ye arches wch goe upward are of ye same breadth with those of ye side isles, yt they may by this meanes agree in vaulting.

1673.—Objection against ye modill of St. Paul's standing in ye Convocation House there as its now designed by Dr. Renne, July 12, 1673, according as it offered itself unto mee upon ye short and confused vewe of ¼ of an houre onely.

Planta.—First as to ye forme of it its wholly different from yt of all ye cathedralls of ye whole worlde, beesides this beeing one long continued body onely; all others beesides, in ye forme of a crosse either more or lesse.

2ndly.—Yt ye two side isles are wholly excluded from ye nave of ye church and turned into uselesse porticos without instead of adding a spacious gracefullness to ye church within.

3rdly.—In setting ye cupolo at ye west ende of ye church insteade of over ye middle of ye crosse isles, and then separating ye whole diameter of this cupolo from ye nave of ye church as I remember wch hath most causelessly and ungracefully shortened it.

4th.—Makeing 3 severall porticos all of ye same fashion at ye western ende of ye church whereas there seemeth to bee noe necessary use of any more than one.

The upright.—As to this I had scarce time to viewe it, soe can saye but little to it; but see since thyt (as I remember) there is a double portico, as it were, one over ye other, ye lowermost looking from ye church, ye uppermost into it, whether all ye sidelights of ye nave come not through the upper portico, wch, if soe, then how darke and ungracefull will ye nave ber.

2ndly.—How ungracefully and weakely doe ye lucarnes stand wch are over ye portico of ye east ende, etc., vide with what basement ye church raised. What ornament of ye windowes to ye porticos, etc. Ten windowes as I remember make ye whole length of ye church, ye architects in such cases usually make an odde one.

That wch I observed in ye cupolo were yt ye pillers stood too thick and consequently ye windowes between too much crowded and too plaine beeing without all ornaments and yt there were noe lucarnes in the arch of it and contrary to all coustume wch must needes darken it."

The Clarendon House which we have already mentioned is also noticed in Evelyn's Diary. In a letter to Viscount Cornberry, January 20, 1665, he speaks of its glories in language which would have been intensely flattering to the architect had he heard it. He says :—

"My old friend and fellow traveller (cohabitant and contemporarie at Rome) has perfectly acquitted himself. It is without hyperbolies the best contrived, the most usefull, gracefull, and magnificent house in England. . . . Here is state and use, solidity and beauty most symetricaly combin'd together. Seriously there is nothing abroad pleases me better, nothing at home approaches it. I have no designe, my Ld, to gratifie the architect beyond what I am obliged as a profess'd honorer of virtue wheresoever tis conspicuous. . . .

What shall I add more, *rumpatur invidia?* I pronounce it the first palace of England, deserving all I have said of it and a better encomiast."

In his "History of England," chap. 64, Hume also speaks of the Chancellor's house as "A building likewise of more expence and magnificence than his slender fortune could afford, being unwarily undertaken by him, much exposed him to public reproach, as if he had acquired great riches by corruption."

Sir Roger has many memoranda about the building materials area, &c., and now when even the memory of the splendid mansion has gone it is interesting to learn that "Ye middle point of ye house is to bee putt exactly to ye middest of St. Jameses Streete and care to bee had, yt ye house bee sett in a right angule to ye streete and allsoe parallel to ye court wall before it."

Although the final results were so satisfactory they were not attained without much worry and trouble to the architect. We hear of "repaires of glasse broken, 65*l*. 4s.: *ergo cave*"; and "some certaine agreement to bee made as to ye soder to be used for in delivery and use of this there is great deceite, plummers, etc., can make their own sodder." But it was not alone trifles like "sodder and glasse" that he had to contend with. We gather from a letter to my Lord Chancellor (who appears to have complained of him exceeding his estimate) that

"this calculation was made upon this supposition . . . that all materialls should bee served in according as they were then offered to mee, and ye worke finished according to ye bargaines then made" but "ye brickes (which) were all assured mee to bee made on yr. lordshippe's grounde at 8sh. 6d. p. thousand, but ye brick earth in my Ld. Bartlett's grounde being at first long disputed and two of our master brick makers dying successively of ye plague and many other of theire servants who were most active in it, the bricks made upon yr. lordshippe's grounde were verry few, in regard of the whole and most of them beeing unseasonably made, verry defective, soe yt wee were forced to sollicite Sr. Nicholas Crape to furnish us from his clamps wch . .] cost at least 15sh. p. 1,000.

As for ye tymber ye Dutch warre comeing on ye price of it increased; ye carpenter by yt time hee had framed and raised ye 1st floore professed himself to bee utterly undone by soe greate an undertaking, refused to goe forward, and humbly submitted himselfe to yr. Lordshippe's mercy, to deale with him as you pleased."

One might suppose from the above that this workman was of a humble mind, but the sequel proves the reverse. It reminds one rather of a modern strike leader to read of his conduct when as

"At this time ye towne was highly infected, ye workemen everywhere dyed, and where to finde a more active or able master carpenter was verry difficult and uncertaine, but most assuredly wee should have bin obleeged to ye rates hee had refused. Whereupon twas thought ye best by faire wordes and promises [Oh, Sir Roger!] to encourage him to persist in his begunn undertakeings, wch yett hee would not doe without first makeing new propositions to wch though wee would not hearken least wee should heve given an ill example to our other workemen, yett were wee necessitated from time to time still to supply his occasions with money wch thing hath now brought his accounts to one third at ye least more than his former bargaine."

* His friend Evelyn, who has been described as a "thorough, if prudent, Royalist," also found it expedient to travel lest he "should be exposed to ruine, without any advantage to his Majestie."

It is melancholy to think that this splendid building was levelled to the ground in the year 1683. Referring again to Evelyn's Diary, under the date August 18 of that year, we find :—

"After dinner I walked to survey the sad demolition of Clarendon House, that costly and only sumptuous palace of the late Lord Chancellor Hyde, where I have often ben so cheerfull with him and sometimes so sad, happening to make him a visite but the day before he fled from the angry Parliament. . . . . The Chancellor gone and dying in exile, the Earl, his successor, sold that which cost 50,000*l.* building to the young Duke of Albemarle for 25,000*l.*, to pay debts which how contracted remains yet a mystery.

However it were, this stately palace is decreed to ruins, to support the prodigious waste the Duke of Albemarle had made of his estate since the old man died. He sold it to the highest bidder, and it fell to certain rich bankers and mechanics, who gave for it and the ground about 35,000*l.* Tis said they have already materials towards it (St. James-square ?) with what they sold of the house alone more worth than what they paid for it.

See the vicissitudes of earthly things."

A. S.

PARIS EXHIBITION AWARDS.

THE following are some of the awards to British exhibitors at the Paris Exhibition. The Exhibition has been divided into eighteen groups, which are subdivided into 121 classes :—

Group IV., Class 19, Mechanical Engineering.—Grands Prix : Parsons & Co. ; Willans & Robinson ; Galloways, Limited. Gold Medals: Marshall, Sons, & Co. ; Ruston, Proctor, & Co. ; Ransomes, Sims, & Jefferies ; Garrett & Sons, Limited ; Robey & Co. ; G. & J. Weir, Limited ; Patent Exhaust-Steam Injector Company.

Class 20.—Grand Prix : Crossley Bros. Gold Medals: Hornsby & Sons; Priestman Bros. ; Tangyes. Silver Medals : Ruston, Proctor, & Co. ; Robey & Co. ; Blackstone & Co. Bronze Medal : Duke & Ockendon.

Class 21.—Gold Medal : Merryweather & Sons, Limited.

Class 22, Machine Tools.—Grands Prix: Kirchner & Co. ; Smith & Coventry. Gold Medals : Kendall & Gent ; A. Ransome & Co. ; B. & S. Massey ; T. Robinson & Son. Silver Medals : J. Holroyd & Co., Limited ; Brunton & Trier ; Samuelson & Co. ; J. Bertram & Sons.

Group V., Electricity.—Grand Prix : Siemens, Bros., & Co., Limited. Gold Medals : C. A. Parsons & Co. ; Mather & Platt, Limited. Silver Medal : Robey & Co., Limited.

Group XII., Class 66, Fixed Decorations of Public Buildings and of Dwelling Houses.—Grands Prix : E. Lutyens ; Waring & Gillow, Limited. Gold Medals : Bertram & Sons ; Clowes, Limited ; Howard & Sons, Limited ; Starkie Gardner, & Co. ; Jeffrey & Co. ; Wall Paper Manufacturers, Limited ; Wright & Co. Silver Medals : Johnson & Appleyards, Limited ; Parquette ; Thompson & Co. ; Bromsgrove Guild applied Arts ; Arrowsmith. Bronze Medals : British Non-Flammable Wood Co., Limited ; Burt & Potts ; Gooddy, Cripps, & Sons ; Wragge; Hope, Limited ; Needs & Co.

Class 67, Glass.—Silver Medal : Heaton, Butler, & Bayne. Bronze Medals : George Wragge ; Guthrie & Wells.

Class 68, Wall Papers and Paper Hangings.—Gold Medals : Jeffrey & Co. ; Wall Paper Manufacturing Company. Silver Medals : Essex & Co. ; Watson Foster Company. Hon. Mentions : Bromsgrove Guild of Applied Arts.

Class 69, Household and Art Furniture.—Grand Prix : Waring & Sons. Gold Medals : Howard & Sons, Limited ; G. Wright & Co. ; Bath Cabinet Makers' Company ; Johnson & Appleyards, Limited. Silver Medals : Heal & Son ; W. T. Ellmore & Son ; Powell & Powell, Bath ; Ives & Co. ; Bertram & Son ; S. May & Co. Bronze Medals : Lavertons, Limited ; C. Rogers, Son, & Co.

Class 70, Carpets, Tapestry, &c.—Grands Prix : Morris & Co. ; Dauvergne & Co. Silver Medal : Bromsgrove Guild of Applied Arts.

Class 71, Decoration.—Silver Medals : Waring & Gillow ; Howard & Sons, Limited ; Heal & Sons. Bronze Medals : Bromsgrove Guild of Applied Art ; Johnson, Appleyard, & Co., Limited.

Class 72, Pottery and Porcelain.—Gold Medal : Farnley Iron Company. Silver Medals : Harrison & Son ; Belleck Pottery Works, Limited ; Medmenham Pottery. Bronze Medals : Elton; Major, Limited ; Tooth & Co.

Class 73.—Gold Medal : Riley Manufacturing Co., Limited.

Class 74, Apparatus and Processes for Heating and Ventilation.—Gold Medals : Musgrave & Co., Limited ; Hartley & Sugden, Limited; Lumby, Son, & Wood, Limited ; Blackman Ventilating Company, Limited ; McClary Manufacturing Company. Silver Medals : Adshead & Smelling ; Cartland & Son, Limited. Bronze Medals : Evered & Co. ; Gasorcoal Stove Company, Limited ; Star Iron Company ; Chaplean & Son.

Class 75, Apparatus, &c., for Lighting.—Silver Medals : A. C. Wells & Co. ; Haynes & Co. Bronze Medal : Evered & Co. Hon. Mention : A. C. Wells & Co.

Group XVI., Class 106, Workmen's Dwellings.—Grand Prix: Lever Brothers. Gold Medal : London County Council. Hon. Mention : Humphreys, Limited.

Class 111, Hygiene.—Grand Prix: George Jennings, Lambeth. Gold Medals: Brown-Westhead, Moore, & Co. Silver Medal . Ramsom ; Jeye's Sanitary Compounds Company ; Septic Tank Syndicate, Exeter ; Lambton Collieries, Limited.

NATIONAL UNION OF SANITARY INSPECTORS.

THE fourth annual conference of the National Union of Sanitary Inspectors was held at the Town Hall, Leamington, on Friday and Saturday, August 24 and 25. On Friday morning the members attending the conference were received by Dr. H. Mason, Chairman of the Health Committee, who expressed the opinion that the Union was a very useful one. Mr. J. K. Anderson, sanitary inspector, read a paper on Leamington as a health resort ; Mr. J. Peers, Wolverhampton, on the difficulties attending the seizure of unsound meat ; and Mr. A. Kent, Hanley, on the responsibilities of occupiers for the abatement of nuisances.

The proceedings of the conference were resumed on Saturday morning, when Miss Constance Cochrane, of the Parish Council, St. Neots, Hunts, contributed a paper on the housing of the working classes in rural districts. In the absence of Miss Cochrane Mr. Spears read the paper, which stated that Miss Cochrane had been actively engaged for the past two years in collecting facts as to the present condition of rural housing, and had personally inspected forty-five of the worst villages.

As a result of her investigations she realised more forcibly than ever the desirability of making medical officers of health, and, perhaps, inspectors of nuisances, independent of the Rural District Councils, and with salaries sufficient to secure good men. Inspectors of nuisances should be properly qualified men, not publicans, broken-down farmers, and men who have failed and whose friends desire them to be pensioned off at the public expense. She also considered it desirable that rural inspectors should not remain in one district for more than three years. When she first commenced her inquiries she was prepared to find the small owners the worst offenders as to cottage property, but experience had shown that this is not the case, and that there is no difference between these and many of the county squires, especially if these latter are non-resident. In three typical and recent cases the worst offenders were (*a*) a large owner who is a magistrate, chairman of a Rural District Council, and a County Councillor ; (*b*) a County Councillor ; and (*c*) a Rural District Councillor, who is agent to the owner of the neglected and dilapidated village which he himself represents. In many country districts men apparently get themselves elected on Rural Councils with the object of obstructing sanitary reform.

There were good laws, but they were not enforced. Why did not the Local Government Board compel Rural District Councils to carry out their legal obligation ? and why did the Board consent to the appointment of thoroughly incompetent sanitary inspectors ? But granted efficient sanitary inspection, much would remain to be done in the matter of providing additional cottages for agricultural labourers, unless the land was to go out of cultivation.

Mr. R. John Hughes, sanitary inspector, Rhyl, read a paper on the housing problem as affecting the casually employed of urban districts. He said the casually employed are more affected than any other class. The frugal artisan could to a large extent solve the difficulty for himself. The tenement houses were generally overcrowded, dilapidated and sub-let in rooms, with conveniences used in common, and no responsible oversight. The habits of the occupiers suffer in consequence, and were a menace to the community. Their needs were but small, and a successful housing scheme for them must not attempt too much, but only provide for their wants. These would consist of a living-room, also used as a sleeping-room, a bedroom and a small scullery. An experiment on these lines had been successfully carried out at Liverpool. Overcrowding had only been dealt with in a half-hearted manner in the past, but with the awakening of public interest in the housing question further action would be possible in the future.

The necessity for doing something to ameliorate the condition of the poorer classes had long been recognised. The Legislature had sought in the Torrens Acts, Cross Acts, the Public Health Act, 1875, and the Housing of the Working Classes Acts, 1885 and 1890, to equip authorities with powers to this end. With the exception of the 1890 Act the cost of these was prohibitive.

The 1890 Act had been sufficiently adopted to afford an abundance of statistics, showing that its provisions could be satisfactorily enforced. The advantage of municipal v. private enterprise in building houses for the working classes was that the former built for health and the latter to secure the greatest profit. Part 1 of the 1890 Act dealt with large unhealthy areas ; part 2 with small unhealthy areas, and part 3 enabled authorities to build houses when they thought fit. Part 1 was found to be costly in operation, and action in the future as far as practicable might well combine parts 2 and 3 ; building new houses under part 3, and closing and demolishing under part 2. Co-operative Societies and employers of labour might also do much. "Trusts" and "Artisans Dwellings Companies" had done much in the past, and a further extension of them was desirable.

The rents of the new houses erected for the poor should be fixed at the lowest possible figure. They could be lower than at present if the Local Government Board were to extend the period for repayment of loans to 100 years for land and sixty years for buildings, postpone the operation of the sinking fund, and lend money at 2½ per cent. Hygiene should be taught the rising generation in schools and elsewhere. The improved habits of the people rehoused under clearance schemes was gratifying and encouraging, and care should be taken that the new houses should only be made sufficiently attractive to induce the poorer classes to live in them.

Mr. Pearce, Wolverhampton, said they had some back-to-back houses in his district, but they had been successful in persuading the owners to alter them into through houses.

Mr. Davis, Clitheroe, said the great need in his district was for houses at 2s. 6d. per week rent ; but, unfortunately, houses could not be built to be let at that rent.

Mr. Lowery considered the chief need of the rural districts to be an improved water supply ; but he admitted that there were more filthy and dilapidated houses than there ought to be in such districts.

Dr. Berry, Wigan, considered the existing law as to closing dilapidated houses sufficiently strong if properly enforced.

Mr. Spears, West Bromwich, cited an instance in which there were sleeping in a single room an aged woman, the occupier, her unmarried son, aged forty-five, a married son with his wife and four children, the two eldest, a boy and girl, being eighteen and sixteen years of age.

Mr. J. Sumner, Wigan, read a paper on the new Food and Drugs Act, and Mr. J. S. Lloyd, M.R.C.V.S., Manchester, contributed a paper on the construction and regulation of dairies and cowsheds.

The members visited Warwick Castle, Guy's Cliffe, Kenilworth Castle, and Stoneleigh Abbey and Park during their stay in the district.

CONDITIONS NECESSARY FOR SUCCESSFUL PURIFICATION OF SEWAGE BY LAND TREATMENT.

THE following paper by Mr. H. Royle, Assoc. M.Inst. C.E., was read before the Incorporated Association of Municipal and County Engineers, at the annual meeting held in London in July :

"The author desires to endorse the remarks made by Colonel Jones in his paper on 'Sewage Farm Management,' read at the annual meeting at Halifax in 1895, in regard to the very limited knowledge possessed by sewage-farm managers as to the proper treatment of sewage, and how few there are who thoroughly understand the matter. Colonel Jones said he could count on his fingers the self-educated sewage-farm managers who did justice to their charge, and we know that if any authority requires such a manager he is rarely to be found. Colonel Jones suggests technical education at model sewage farms for managers and watermen, where a register of qualified persons could be obtained.

The author, having had fifteen years' experience in sewage farming with crude sewage on the broad irrigation principle, after having laid out a farm of 40 acres, is desirous of imparting his experience and knowledge for the benefit of the members of this Association. In the first place, it is well known that a good soil is of the utmost importance for the due and proper treatment of sewage, and must be combined with efficient under-drainage in order to produce a good effluent; nevertheless, when these two essentials are at hand the desired results are not always obtained. This may appear strange, yet such is the fact; and why is this so? The author's object is to endeavour to supply this information from the experience gained on the Stretford sewage farm, which is undoubtedly a first-class farm, and is justly considered as the model sewage farm in the watershed of the joint committee of the rivers Mersey and Irwell.

The scheme is a pumping one, and the sewage is received into a large receiving tank. It is then pumped into a cistern, from which it flows through an underground cast-iron rising main, and underground earthenware carriers, having hydrant chambers and penstocks for distribution of sewage over the land as may be desired; thus, so far, this arrangement is common to most sewage farms. The land varies as to quality, the soil being an alluvial deposit, and has a gentle fall from the west to the north; the under-drains on the northerly half of the farm are not so deep as on the westerly half and the soil is of a slightly stiffer nature; it is therefore not so suitable for sewage treatment as the westerly half.

On first draining the land, agricultural draining tiles, some of 6 in. and some of 4 in. in diameter, were laid at a distance of 20 yards apart (agricultural tiles the author considers are the best on account of their porosity); these, after a time, were found to be inadequate, so that intermediate drains are being laid as time in winter permits. Originally the whole of the land was in grass (old meadow-land), and in covering up the drains the green sod was turned upside down and laid immediately on the tiles, and the filling in well rammed up to the surface. Twenty-five acres of this original surface was sewaged for three years without any tillage whatever, and during this period a first-class effluent was produced. In due course the herbage became coarse under sewage treatment; the land was then ploughed up, and a regular rotation crop has been carried on up to the present time. After ploughing, defects began to show themselves: occasionally there was not so good an effluent as before when in grass. This was found to be due to the rotting of the fibres of the sods, which caused a small cavity between the earth and the tiles; these drains have since been opened out, the sod portion removed, and the ground thoroughly well rammed from bottom to top as solid as possible. The drains on the farm vary in depth from 3 ft. 6 in. on the northerly side to 5 ft. on the westerly side. Previously to taking out the rotted sods on the drains it was necessary carefully to avoid putting sewage over the line of some of them. This was easily done, as the whole of the drains on the farm are laid in parallel lines, not in herring-bone fashion—which latter is, in the opinion of the author, on a sewage farm a decided mistake—in which case keeping the sewage off the line of pipes would have been an impossibility.

On sewage farms worms and rats occasionally are a source of great trouble and annoyance by their burrowing, especially where the drains are shallow, causing small holes which allow the sewage to get into the drains without having been filtered through the land, and thus a bad effluent is the result. In dealing with an infected worm area, of which we have had numerous experiences, we pump the very strongest sewage we can from the bottom of the tank, and on some occasions, previous to closing the land with strong sewage, have sunk down to the drains and temporarily blocked them up, and have thus been so far successful in killing the worms that the land has again continued to produce as good an effluent as before. The worms do not die in their holes, but come to the surface. They have caused an imperfect effluent, even when the drains have been as much as 4 ft. 6 in. in depth.

It is often stated that land becomes sick through the application of sewage; this is no doubt a fact, for if sewage is applied continuously week after week and month after month without aëration and rest, it will become sick as the micro-organisms in the soil cannot live in waterlogged ground. In consequence many farms have been condemned unjustly as not being successful. As a matter of fact, a recent analysis of the soil of the Stretford sewage farm has proved it to be of better quality after fourteen years of regular sewaging than that of the extension land which had only been sewaged a few times during twelve months.

Having thus in a general way described our mistakes, the author desires to say what he considers essential in making a sewage farm or filtration area successful.

No drain should be laid if possible less than 5 ft. deep, as it is found that worms will burrow as far as 3 ft. 6 in. in depth. In cutting drain trenches through land, it will invariably be found intersected with old draining tiles and spit drains. It is of the most vital importance that these should be carefully noted when cutting the trench, and great care taken to cut them off at least 4 ft. on either side of the new trench, otherwise trouble will begin as soon as the sewage is put on the land. As these old trenches will be found to be only about 18 in. or 2 ft. in depth, it will be seen that a ready unknown carrier is there to convey the sewage to the drains without its having gone through sufficient depth of land to ensure proper filtration.

Again, it is important that the drains should be well and truly laid and with close joints, and in filling in the earth it is of the utmost importance that a layer of the best soil should be placed on the tiles. As to filling in and ramming, this cannot be too well done; in fact, the ground over the newly-laid tiles should be made as solid as before displacement; this precaution is of the utmost importance, as afterwards, if not properly rammed and made solid, no amount of sewaging will suffice to consolidate the land sufficiently for effectual sewage treatment.

Having already pointed out the great importance in making the ground over the drains perfectly solid, and cutting off all lateral old drains, the author desires to point out another fatal error that is made on some sewage farms and filtration areas, viz., the placing of gravel, sand, or cinders on the tiles, or using perforated pipes, with the object of giving, as is generally supposed, a better filtrating medium. This practice is, of all the mistakes that can be made in regard to sewage treatment, the most disastrous; errors of judgment like these have caused many sewage farms to be failures in producing good effluents.

This question of putting cinders on drains must not be confounded with bacteria beds formed of cinders or coke breeze, as the two operations for producing good effluents are not identical. The fact must not be overlooked that the drains are always acting and in operation soon after the application of sewage on the land, whereas bacteria beds have no under-drainage, except such as is required at the bottom of the beds, for the purpose of draining them after complete saturation and aëration, being regulated at will by penstocks after the prescribed time required for filling, saturation, emptying and rest. Unless drains are laid as pointed out, failures are bound to occur; even when laid as suggested they will require frequent examination and repunning, as and when they suddenly go wrong. Want of knowledge in regard to badly-laid drains has undoubtedly been the cause, in some cases, of sewage-farms failing to produce a good effluent, although having ample and suitable land for the purpose. Treatment by chemicals before applying the sewage on the land is then resorted to instead of first putting the drains in order. No doubt many sewage farms are in disrepute solely from want of this drain knowledge, it being a great mistake to suppose that when drains are once laid they will act properly for all time to come, even when in the first instance well laid and well rammed.

In the management of a sewage farm or filtration area it is essential that the manager should keep a strict watch on his effluent and his drains. This can be done if the drains are laid in parallel lines, having examination pits or eyes at the junctions with the main effluent drains, or where they may enter separately into an open channel; it is then possible to ascertain the whereabouts of any drain that may be working imperfectly, and at once to take steps to remedy it, viz., by taking out the soil immediately over the drain and repunning it as if a new drain was being laid. This is a necessity that will frequently occur, and must be attended to if a good effluent is to be maintained.

In laying out a sewage farm or filtration area, the author would impress on all who are called upon to undertake these important works that all drains should be laid in parallel lines, and in the direction of the greatest slope of the land. On no account should the work be let by contract, except the trench cutting; also every care should be taken in laying the tiles and the filling in and ramming solid as before mentioned, for unless this be done a satisfactory effluent is an impossibility; and even after these precautions have been taken it will be found that frequent imperfections and unsatisfactory effluents will occur during sewaging of the land, through worms, rats and other causes, and the remedies mentioned must be resorted to.

As regards a sewage farm manager, Colonel Jones remarked there are few who do justice to their charge. This is undoubtedly true, for unless a manager is thoroughly well up in land drainage—and this, in the opinion of the author, combined with good land is the main secret of producing a good effluent—however well he may be qualified as an ordinary farmer, unless he is well versed both as land drainer and farmer, and takes a pride and interest in his work, trying to produce suitable crops combined with a good effluent (the latter not to be sacrificed for crops), he will never succeed as a sewage farm manager, as such an occupation is so different to ordinary dry land farming as generally understood.

The Stretford sewage farm consisted of forty acres up to two years ago; since then it has been extended to seventy-seven acres. Fifty-seven acres are sewaged on the broad irrigation principle with crude sewage with a dry-weather flow of two-thirds of a million gallons a day, from a population of about 10,000 people, and since the joint committee of the rivers Mersey and Irwell began analysing sewage effluents six years ago, the average analysis of twenty-three samples was ·30 of a grain per gallon on the four hours' test."

ARCHÆOLOGICAL SOCIETIES.

ST. ALBANS ARCHÆOLOGICAL SOCIETY.—A number of the members of the St. Albans Archæological Society recently visited Royston and Ashwell. Royston Parish Church, the nave of which, before the dissolution of the monastery, formed the chancel of the parish church, was first examined under the guidance of the Rev. Joseph Harrison, the vicar, who read many extracts from the paper by the late Rev. Henry Fowler, printed in the Society's Transactions. The remains of the Early English work were much admired, and the late fourteenth-century recumbent effigy of a knight and the brasses were examined. Since the previous visit of the Society to Royston, a chancel has been added to the church. The party next visited King James's Hunting Lodge, which, by the kindness of Mr. Banham, they were allowed to examine. Mr. W. J. Hardy here read some notes founded upon the accounts of the expenses for preparing the buildings for King James's reception, and a survey taken in the time of the Commonwealth. Some discussion ensued as to the portions of King James's buildings which were now standing, as it was apparent that no part of the external brickwork of Mr. Banham's house was of the seventeenth century. The members went on to see the celebrated Royston Cave. This interesting object, of which there is practically little or no tangible record, is supposed to date back, as regards its upper part, to Roman times, and was deepened and converted into a chapel or oratory in the twelfth century. The curious figures representing saints and kings carved in high relief in the chalk on the sides, which were originally coloured, are not possibly all of the same date. Some criticisms were made on the use of Arabic numerals in the date, 1347, which is cut in the chalk, and is supposed to be contemporary. At Ashwell Church the members were taken under the guidance of the Rev. Canon Davy, who pointed out the objects of interest in that church, which was built and altered at a time when Ashwell was a town of some wealth and importance. Canon Davy took the opportunity of referring to the loss which the Society had sustained by the death of the Rev. Henry Fowler, for so long his fellow secretary, and from whose paper on Ashwell

Church, which is printed in the Transactions, he had so largely quoted. The earliest record, said Canon Davy, of the church was in 1223. The Abbot of that day, Richard de Berkyng, was Chief Baron of the Exchequer and Lord Treasurer of England. He was a great appropriator of rectories, and amongst others it is stated by Sporley, the monkish chronicler of Westminster, that he acquired the Church of Ashwell. The patronage before this appeared to have been in the hands of laymen. The church appeared from earliest times to have been dedicated to St. Mary the Virgin, whilst the neighbouring church of Newnham has the rare and probably very early dedication of St. Vincent, the Spanish deacon who suffered martyrdom, like St. Alban, in the Dioclesian persecution. It was believed that only four churches in England had this dedication. With regard to its architectural part, the church was one of the finest in the county, the chief feature being the tower, which is the highest in the county, standing 175 ft. high, or 10 ft. higher than Peterborough Cathedral, and 45 ft. higher than the central tower of St. Albans Abbey. No clue was afforded by any records as to the date of the construction of the church. In the eastern bays of the nave arcade there were to be seen some good specimens of Early Decorated work, but nothing of an earlier date was discoverable in the building. The nave appeared to be Perpendicular, but on closer inspection they found in the jambs of the blocked doorway (which once opened into a chapel on the north side) a Decorated moulding, also on the outside a piscina with a Decorated canopy. The chapel was extant when Salmon wrote his history of Herts in 1728, and there were good grounds for believing it to be the chantry of Thomas de Stanton, whose "grant of 12 acres of land to provide for the singing of daily masses for his soul" was made in 1306. The chancel was probably reconstructed about 1306, the window features being transformations of a much later period effected without pulling down the walls. It was probable that the reconstruction of the whole church commenced about the time of the accession of Edward II., and the work was carried on progressively towards the west. Canon Davy then turned to the tower. The top stage, he observed, was clearly no part of the original structure, but an addition of Perpendicular times. The original tower consisted of three stages, the upper one being furnished with a coping which now does duty as a string. The walls were extremely massive, being 7 ft. thick at the base, and this, combined with the bulkiness of the tower, suggest that it was built to carry a spire. An inscription in the church recorded the extraordinary storm of wind which began on St. Maur's day, 1361-2, following the great pestilence of Edward III.'s reign. The late Rev. H. Fowler used to be of opinion that the inscription commemorated a catastrophe which occurred at Ashwell during that storm. The gale brought down the spire and a mass of masonry from the top of the tower, and the débris fell on the western part of the nave with destructive effect, and the shattered arches were then reconstructed. This would account for the Early Perpendicular work to be observed. This same gale also blew down the spire from Norwich Cathedral. The walls of the baptistry (which serve as buttresses to the tower) received their panelling at the time of the reconstruction of the tower arch. The Tudor windows on the south side suited the date of John Bill's bequests, and were probably his gifts. The Perpendicular windows in the north aisle were probably the gifts of John Harrison (of Hinxworth), whose tomb stands behind the organ. The east window has good Decorated tracery, and appeared to be the only unaltered one in the church. The Canon then spoke of the various interesting inscriptions, and finally pointed out the decayed state in which the tower is now owing to the softness of the stone, and the urgent necessity for restoration which now exists to preserve it. A new and more correct reading of the well-known inscription in the tower of the church, supplied by Mr. Charles Johnson, was read by Mr. Page. With regard to the tower of Ashwell Church the hon. secretaries have supplied the following note. The tower roof and the spire are at the present time subjects not only of great local, but of much more than local, interest. It is a matter for some regret that the finest tower belonging to any parish church in the county is in a tongue running into Cambridgeshire, but it has always belonged to Herts, and is a subject for legitimate pride. The secretaries write:—It is a good climb up the much-worn stairs to the top of the tower, but a fair number of the members did climb, and this led to much interesting discussion. In the result there was general agreement that the oldest parish church tower in Herts and its characteristic skyline do not differ greatly from what was seen in mediæval times. Steep roofs lead from the gutters inside the tower parapet to an octagonal top, with vertical sides, each side being 4 ft. 3 in. in width. At the top of each of the sides there is a band of three quatrefoils, and a moulded cornice. Small pinnacles exist at the angles of the octagon. From the flat roof covering in this octagon, with vertical sides, starts a small stump spire (a "spike" in idea). The timber construction is simple. . . The roof of 1714 was apparently a reconstruction of previously existing framework, with some new and many old timbers. The decorative details are of Perpendicular date. The names of the persons engaged in carpenters', joiners', and plumbers' work in 1874 are recorded on the lead work below one of the sides of the vertical octagon. In general form, the leaded construction on the tower of Baldock Church resembles that at Ashwell; but Ashwell has the lead—is, in fact, far ahead of Baldock—in general form and in details. Such rare work as Ashwell retains should be forthwith well illustrated, and should be preserved with great care for all time. The idea of getting rid of the roof and spire in place of repairing them is said to be in the air; but the destruction of such work, or even acquiescence in rapid decay, should be rendered impossible. —*Bedfordshire Express.*

Illustrations.

OLD BAILEY SESSIONS HOUSE.

THAT a good architectural work should express externally the disposition of that which it enshrines is an acknowledged axiom, and in the case of the Old Bailey Sessions House the difficulty which confronted the competitors was so to arrange the accommodation required on the limited site as to present a homogeneous and complete building. The difference in the depth of the ground suggested the cutting the site into two parts, and in the event this has proved the most successful arrangement.

In the design illustrated, however, the building has been designed as one. The centre of the frontage in the Old Bailey is in this design the centre of the plan as well as of the elevation. The rounded corner was suggested by the committee, and was developed on plan into a State entrance for the Lord Mayor and judges, whose rooms are grouped at this, the widest, end of the site where the large court is placed.

This court, with the others, has been placed as far away from the noise of the traffic as possible. A scheme for keeping the witnesses together in one group was worked out, which should have certain advantages. On the ground floor they are assembled, and from here they can be drafted by a special staircase to the rooms on the court floor when they are immediately required. These open again on to the large central hall communicating with each court.

On the floor above are placed the witness and solicitors' consultation rooms, &c. This system of concentration has been adopted throughout, and intercommunication ensured by ample and direct corridors.

The present unique and magnificent prison buildings have no doubt more or less influenced the competitors, but in the elevations illustrated a somewhat lighter vein has been introduced, without, it is hoped, departing from their dignified and monumental character.

J. BELCHER.

ABERDEEN CITY ARCHITECTSHIP.—At a recent meeting of Aberdeen Town Council, it was resolved "That in view of the great increase of architectural work devolving upon the council, it be remitted to the Special Committee in connexion with the Borough Surveyor's department to consider and report on the duties of the city architect, and whether an arrangement can be carried out to combine the whole of the city's architectural work under one official and one office." There was considerable discussion, in the course of which several members urged that Mr. John Rust, jun., city architect, had done his work well. Ultimately the motion was adopted by sixteen votes to eight.

BOOKS RECEIVED.

ORNAMENTAL DETAILS OF THE ITALIAN RENAISSANCE. — Measured and Drawn by G. A. T. Middleton and R. W. Carden. (B. T. Batsford.)

AN EPITOME OF THE LAW AND PRACTICE CONNECTED WITH PATENTS FOR INVENTIONS.—By J. Johnson and J. H. Johnson. Third edition. (Longmans, Green, & Co.)

Correspondence.

To the Editor of THE BUILDER.

PARIS EXHIBITION AWARDS.

SIR,—Will you kindly note in your next issue that the name of Mr. E. Ingress Bell should be coupled with mine in the list of awards at the Paris Exhibition.

ASTON WEBB.

STOWE HOUSE, BUCKINGHAM.

SIR,—Your interesting account of Stowe is very good reading, but I fancy much extra information could be gleaned from the perusal of an excellent paper on the "History of Stowe," by the late (and last) Duke of Buckingham and Chandos, G.C.S.I., which is printed *in extenso* in the *Bucks Archæological Magazine*, Vol. V., No. 7, 1885. I had the pleasure of hearing it read on August 11, 1884, on the south front of the mansion by the Duke himself (after the members of that society had been entertained to luncheon by his Grace in the "state dining-room, 70 ft. by 20 ft.," which you quote). The late Duke called his place "Stowe" (not "Stowe House").

The present mansion is supposed to have superseded or been grafted on to a sixteenth century house of the Temples of Stowe, and the grand entrance hall was built under Lord Temple, and "there were still preserved sketches in his own hand, and emendations upon the architect's plans. He employed several architects to carry out his ideas, and apparently gave the internal arrangements to one and the external to another." I quote from the Duke's own words, which support some of the tenets of your article. To read the whole of it would, I think, be profitable to those who visited the building.

E. SWINFEN HARRIS.

SIR,—I think it may interest the author of the article appearing in the *Builder* of this day's date on the above subject to know that on the 2nd inst., at a bazaar then held, there were on sale sundry early prints—among them "prospects" of the house at varying epochs.

If they are not all sold, no doubt particulars of any still undisposed of might be obtained on inquiry by letter to the Secretary of the Bazaar Committee at the house.

E. HOWE.

August 25.

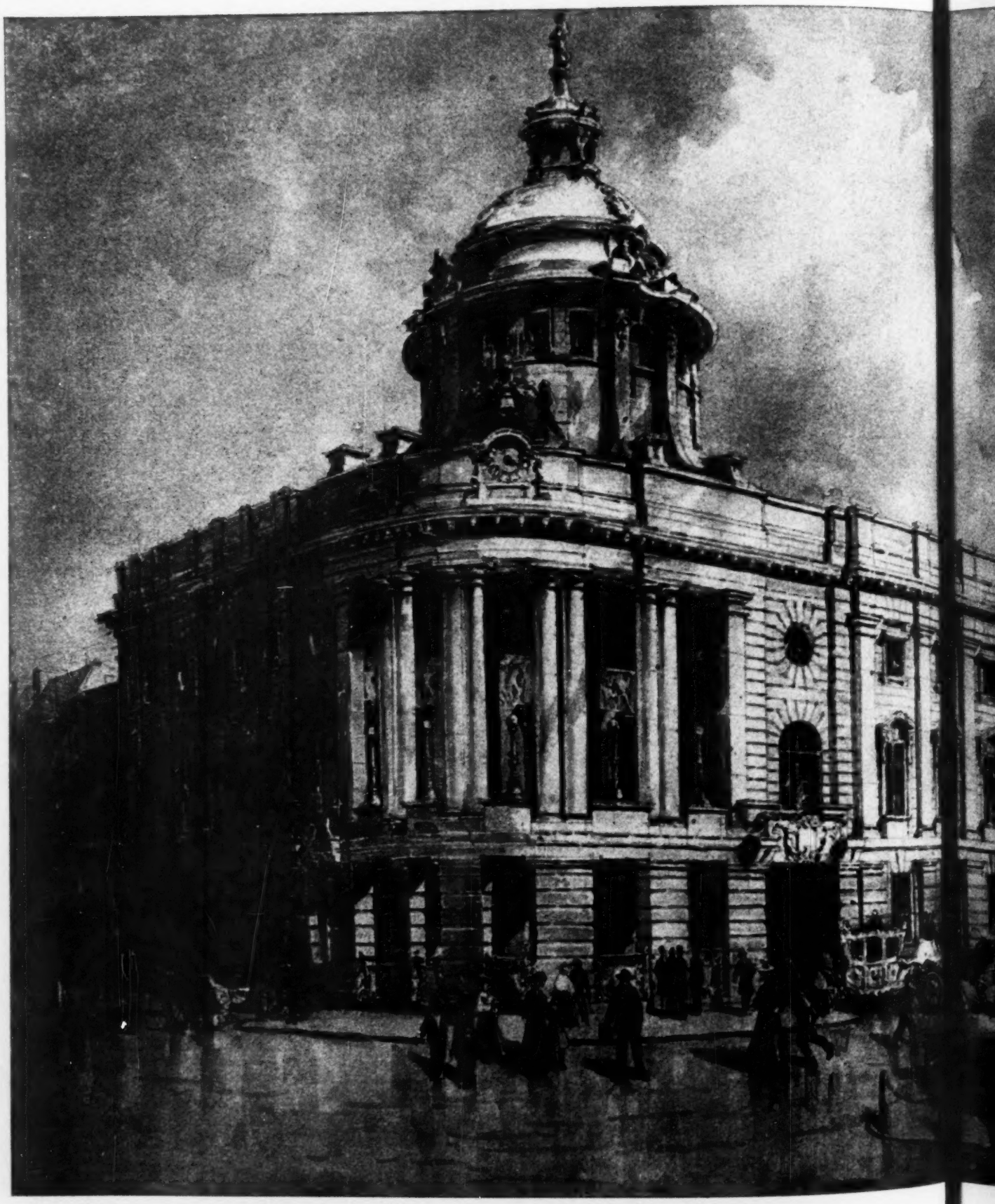
THE ARCHITECTS AND THE DEAN AND CHAPTER OF ST. PAUL'S.

SIR,—It may possibly be deemed presumption by some that one who ranks only as an Associate of the Royal Institute of British Architects should write to you on so important a subject as this. But, since the last formal protest of the principal architects of the day has failed to produce any effect, it appears only too evident that other means of influencing the Dean and Chapter must be tried, in which, directly or indirectly, all must bear a part. For, from the amount of scaffolding to be seen in the interior of the Cathedral, the work promises to proceed with unabated vigour, till every cornice is surmounted by a railing, and texts are stencilled on every available space; till the dignity and the repose of the building is seriously affected, or possibly destroyed.

The erection of the railing which elicited the last protest is so palpably a mistake that one wonders how so eminent an artist could have committed it. The railing in question is an iron one, of so close a pattern and so thickly gilt as to be practically opaque. It appears to be some 4 ft. in height, and is fixed on the extreme upper edge of the main cornice. From its great projection the knobbed ends of the standards appear, when one is standing immediately under the centre of the dome, to cut the line of the chancel attic cornice. From this position it seems to the spectator as though a gilded parapet wall had been built above the cornice behind which the pilasters which support the vaulting ribs disappear. This railing extends around part of the chancel, and preparations are apparently being made to carry it around the whole of the interior.

Some time ago the light of opposition flared up, and finally died out. The erection of this new railing seems to have rekindled it. But the isolated protests of individuals, however eminent, have proved ineffectual in the past, and will be so again. The time has at last arrived when this great matter must be taken in hand by some organised body of recognised position.

Fortunately we possess in the Royal Institute an



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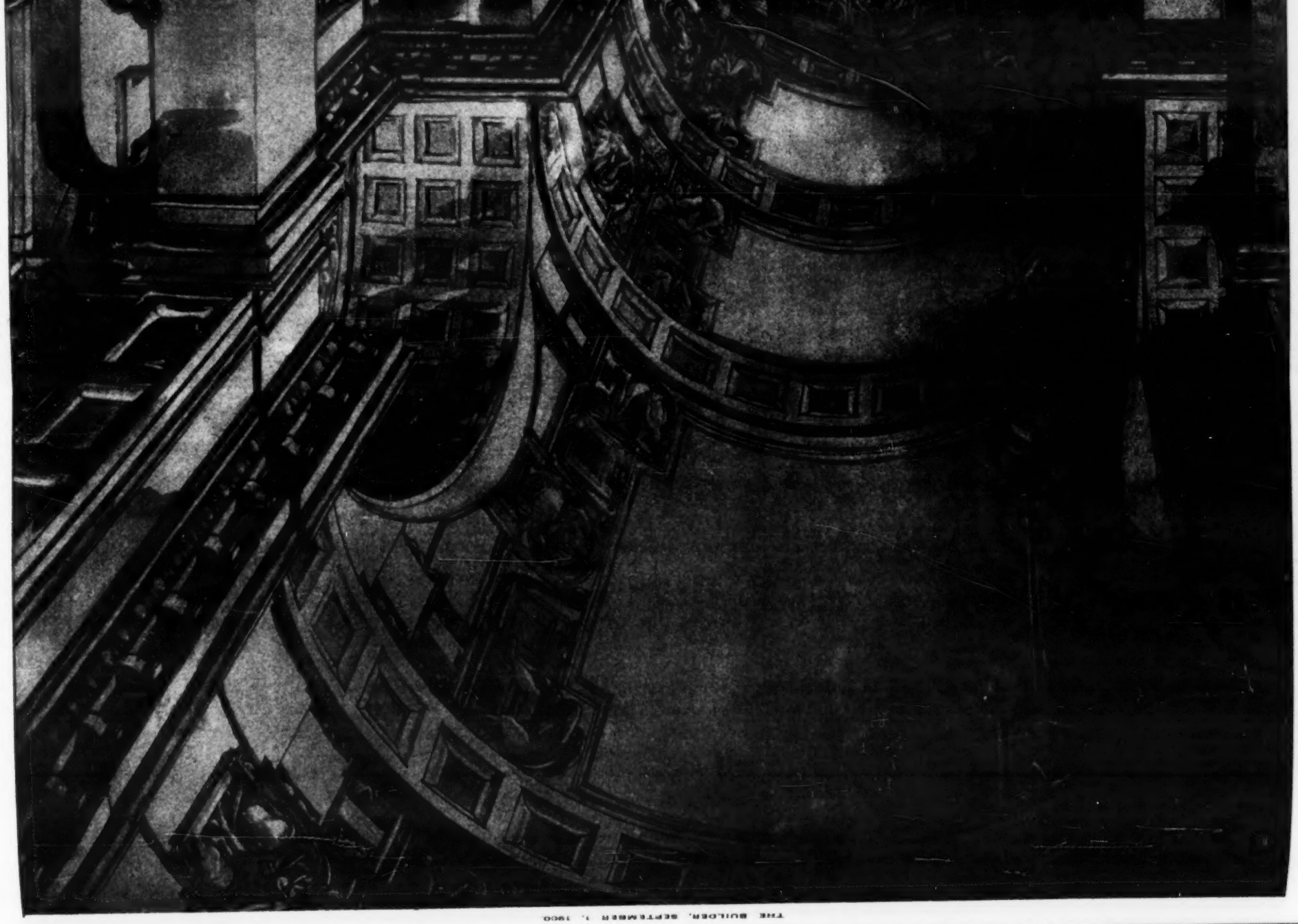
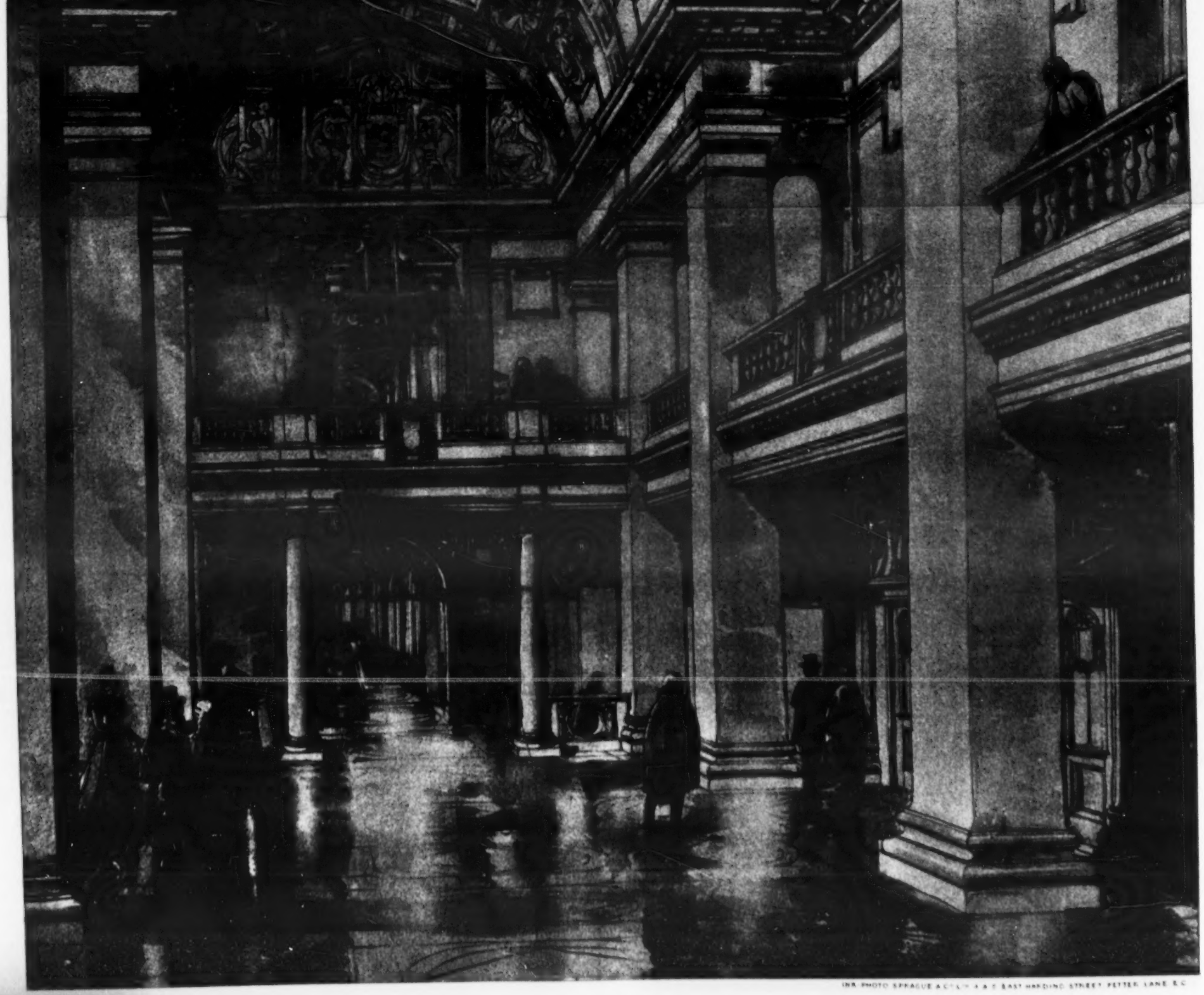
PETITIO—DESIGN SUBMITTED BY MR. JOHN BELCHER, A.R.A.
ERSPEC VIEW.





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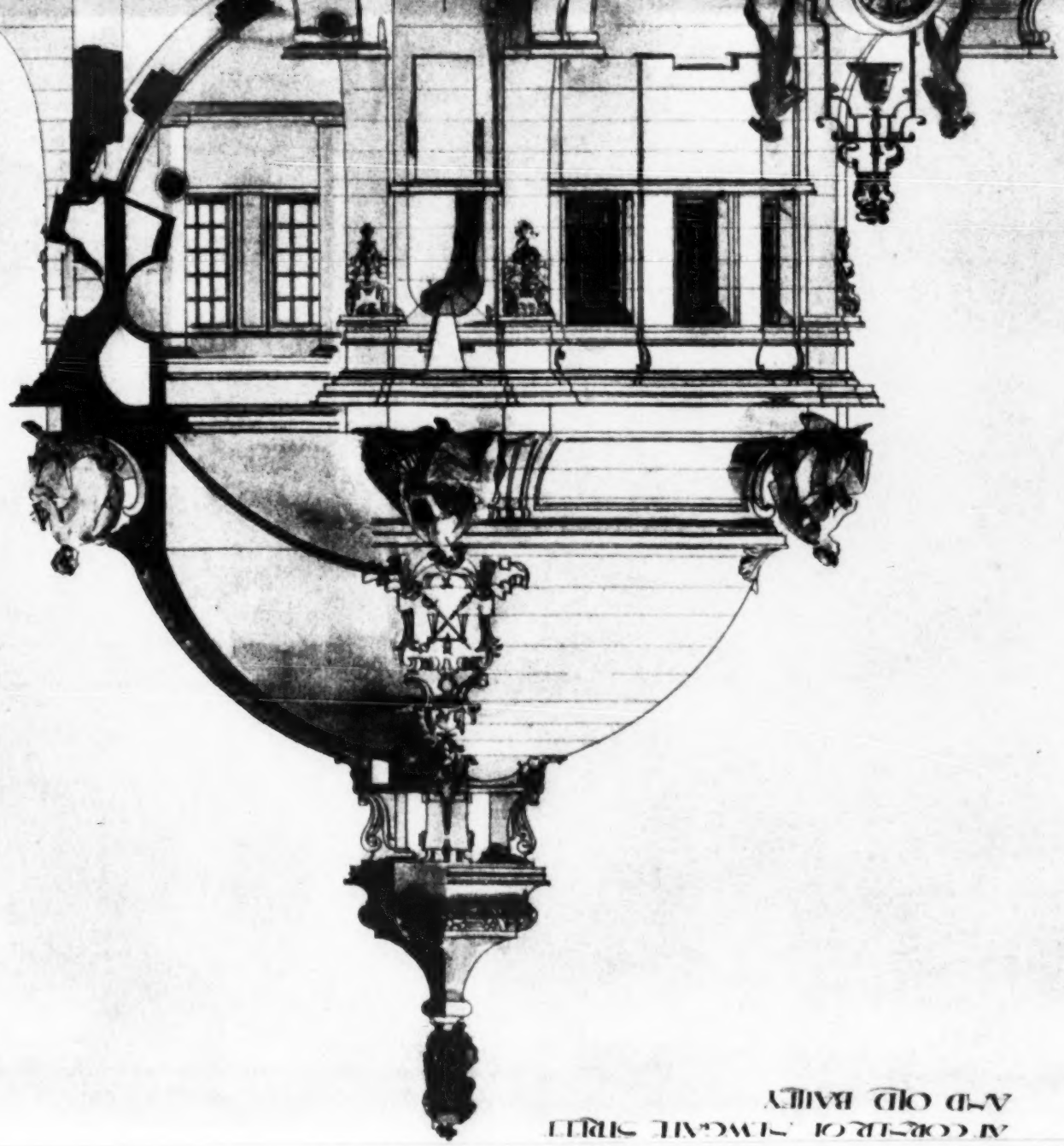
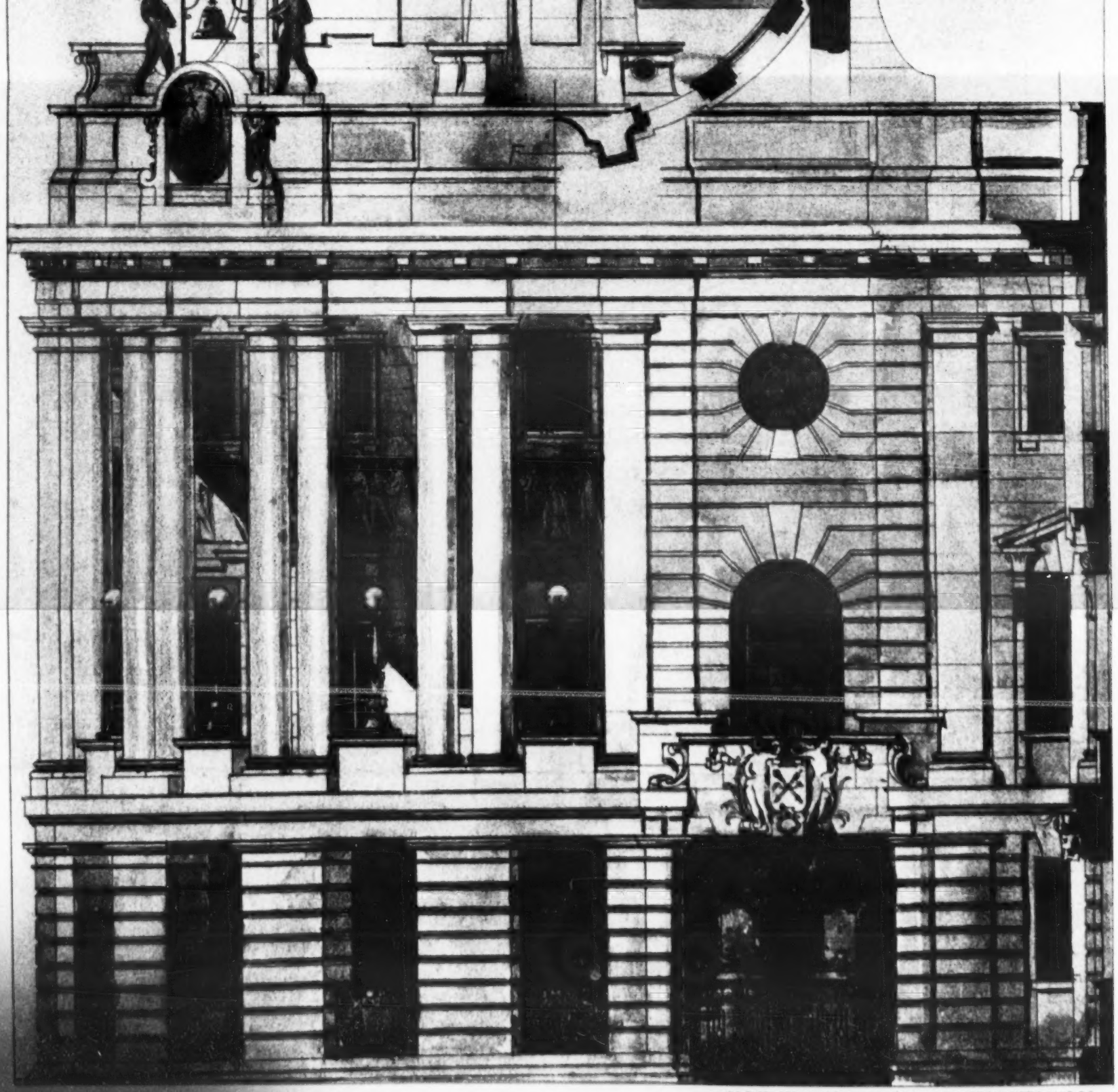
OLD BAILEY SESSIONS HOUSE COMPETITION.—Design submitted by Mr John Belcher, A.R.A.

INTERIOR OF GREAT HALL.

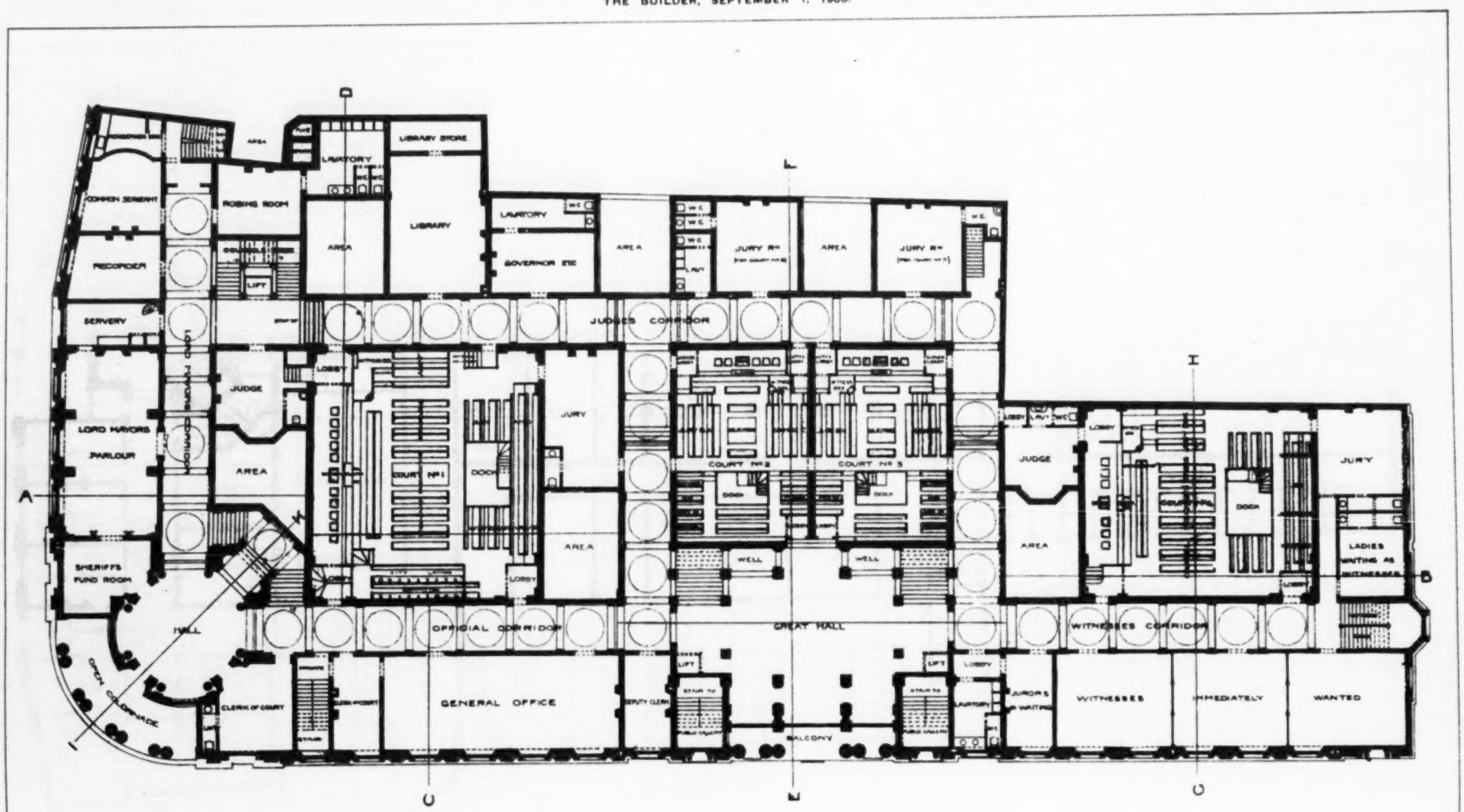


AT CORNER OF SMOAK STREET
AND OLD BAILEY



OLD BAILEY SESSIONS HOUSE COMPETITION.—DESIGN SUBMITTED BY MR. JOHN BELCHER, A.R.A

DETAIL ELEVATION OF ANGLE PORTICO AND CUPOLA.



PRINCIPAL FLOOR PLAN

SCALE OF FEET

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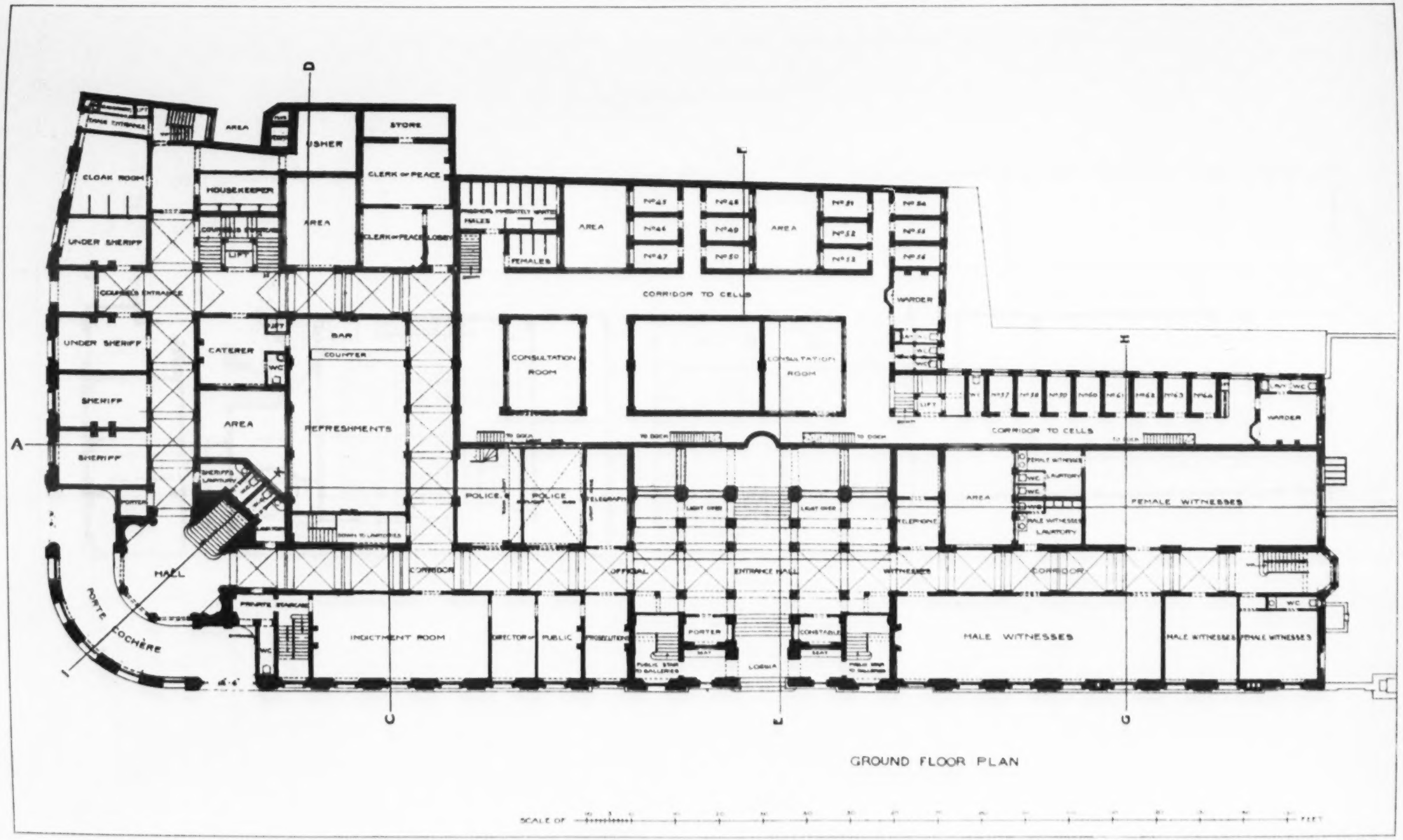
OLD BAILEY SESSIONS HOUSE COMPETITION.—Design submitted by Mr. John Belcher, A.R.A.



GROUND FLOOR PLAN

SCALE OF 10 5 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 FEET

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OLD BAILEY SESSIONS HOUSE COMPETITION.—Design submitted by Mr. John Belcher, A.R.A.

organisation which is able to secure the services of men who are possessed not only of commanding personality but of tact and experience, and who are well fitted to arouse and direct public opinion.

The only hope of saving any portion of the Cathedral in its unsullied grandeur is to induce the Dean and Chapter to submit a definite scheme for the approval or condemnation of the very highest men of the day. Or, if this be impossible, to gain their consent to the collaboration of some experienced architect with the artist who up till now has alone had charge of the work. It is obviously futile to formulate protests after the completion of some portion of the work. The authorities, after having expended the public money upon it, cannot be expected to stultify themselves by immediately giving orders for its removal.

That the great influence of the Royal Institute, if properly applied, can prevent much further injury I believe. That they will attempt to use it I hope. That it is their duty to attempt to use it I feel certain. For St. Paul's is no mean relic of a past age. It is the greatest work of the greatest architect that England has ever produced. The noblest and the last of the great English cathedrals; the crowning work of centuries of effort. The ancient works of other lands do not excel it; few are its peer. There is that in its stern and solemn grandeur that should stay the hand of reckless alteration, and strengthen every feeling of reverent care, lest the religion, the peace, of the building cease to be felt; and we sigh in vain, amidst the restless mosaic and the shimmering gilt, for the calm touch of the master's hand, and the strength of the mind that is still.

HAROLD SMITH, Associate R.I.B.A.

SOUND-PROOF FLOORS.

SIR,—In a building I am shortly erecting for dwellings I wish to make the ordinary floors as sound-proof as possible. I purpose putting felt ½ in. thick, the width of joists, on top of same before laying on the floor-boards.

Would you please say if this will be a successful treatment, or is it necessary to fill in the space between joists to prevent the noise going through the air space? ARGUS.

*** The space between joists should also be filled with sound boarding, and pugging of lime and chopped hay used dry.—ED.

The Student's Column.

LESSONS IN ELECTRICAL ENGINEERING.

8. THE THEORY OF THE ALTERNATING CURRENT TRANSFORMER — BOOSTERS — COMPENSATORS—ROTARY CONVERTERS.

THE alternating current transformer, considered mechanically, is a very simple piece of apparatus. If we have a bundle of iron wires arranged in the form of a ring (fig. 1), and wind round it two

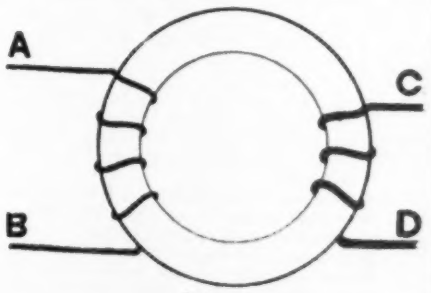

Fig. 1.

coils of insulated copper wire—A B and C D in the figure—then this will be a transformer for alternating currents. If we apply an electric pressure E_1 to the terminals of the coil A B, which we shall call the primary coil, then there will be an electric pressure E_2 at the terminals of the coil C D, which is called the secondary coil. If there be n_1 turns of wire in the primary coil and n_2 turns of wire in the secondary coil, then

$$\frac{E_1}{E_2}=\frac{n_1}{n_2}.$$

For example, if n_1 be 100 and n_2 be 10, then if the applied pressure E_1 be 1,000 volts, E_2 will be 100. From this formula also it is obvious that a transformer can either be used for raising or lowering the pressure. According as the ratio of n_1 to n_2 is greater or less than unity, then E_1 is greater or less than E_2.

A transformer may be compared to a lever. The ratio of the pressures at the terminals of each coil is constant just as the ratio of the forces at each end of a lever is constant. If the electric pressure applied to the primary coil be too high, then the transformer will burn out just as a lever breaks down when the applied force is too great. If copper offered no resistance to the passage of an electric current and there was no magnetic molecular friction in iron, then a transformer would be mathematically perfect, absorbing power at one pressure at the primary terminals and giving it out at another pressure at the secondary terminals, just as a lever would be perfect if it had no weight and was absolutely rigid.

The theory of the alternating current transformer has been worked out with great success during the last few years, and as it is in perfect accordance with experiment and an indispensable introduction to the theory of many other kinds of apparatus, we will give an elementary sketch of it.

When an electro-motive-force (E.M.F.) is applied to the primary terminals A and B (fig. 1) a current at once begins to grow in the primary coil, and this being wound round a bundle of iron wires magnetises them strongly. In modern language it produces a large number of lines of induction or a flux of induction in the iron core common to both coils. This flux passing through the secondary coil creates an E.M.F. in it proportional to the rate at which the flux grows. As this flux also passes through the primary, it creates an E.M.F. in it which is opposed to the applied E.M.F. Now in the primary coil we have three pressures in equilibrium—the applied pressure E_1, the back pressure caused by the varying magnetic flux in the core, and the pressure C_1R_1 required to drive the magnetising current C_1 through the resistance R_1. Just as in statics, these three pressures form a "triangle of forces." In practice the applied E.M.F. E_1 is at least a thousand times greater than C_1R_1, hence the third side of the triangle, *i.e.*, the back E.M.F. caused by the flux in the core, must be almost exactly equal to E_1. Now if the flux through each coil is the same, *i.e.*, if there is no magnetic leakage, then the back E.M.F. in the primary will be to E_2 as n_1 is to n_2. But we have shown that this back E.M.F. is practically equal to E_1, hence

$$\frac{E_1}{E_2}=\frac{n_1}{n_2}.$$

In the above we have assumed that the secondary terminals C and D are open circuited, and hence that there is no current in this coil.

As the applied E.M.F. is an alternating E.M.F., the flux in the core is continually altering in direction, the iron during half a period of the alternating current being strongly magnetised in one direction, and during the other half period as strongly magnetised in the other direction. It is because the flux is always varying that we can get an alternating E.M.F. from the secondary terminals. If we connected the primary terminals to a direct current source of supply, then, during the fraction of a second whilst the core was being magnetised, we would get an E.M.F. from the secondary terminals. Once, however, the flux becomes constant, then there is no E.M.F. generated. It is the continual variation of the magnetic flux in the core that keeps the secondary terminals of the transformer "alive."

The magnetic flux produced in the core of a transformer when there is no load on the secondary is proportional to n_1C_1, *i.e.*, to the number of turns multiplied by the current (the ampere turns) in the primary. Consider what happens when a load is put on the secondary. We have now a current flowing in both the primary and secondary coils. The magnetic flux in the core is the resultant of the magnetising currents in both the coils. Since E_1, C_1R_1, and the back E.M.F. in the primary coil caused by the flux can be represented graphically by a triangle, and since even at full load C_1R_1 is very small compared to E_1, therefore the back E.M.F. in the primary is always nearly equal to E_1. If E_1 be kept constant, as in the commercial transformer, then this back E.M.F. is constant, and therefore the magnetic flux in the core of the transformer is constant at all loads. Whatever the load on the transformer, the number of magnetic lines linking the two coils is constant. It therefore follows that the resultant of the magnetising turns is constant.

This resultant, being equal to the magnetising turns at no load, must be a very small quantity, but n_1C_1 and n_2C_2 are large when the transformer is loaded; hence they must be nearly in opposition in phase, *i.e.*, when n_1C_1 is magnetising the core n_2C_2 is demagnetising it, the difference between the two being the small number of ampere turns required to produce the flux. Hence at heavy loads n_1C_1 is very little greater than n_2C_2.

If C_0 = the current in the primary at no load and f_0 = the power factor of the primary circuit at no load, then the equation connecting C_1 and C_2 is

$$n_1(C_1f_1-C_0f_0)=n_2C_2 \quad \ldots\ldots\ldots (1)$$

This equation can be proved trigonometrically from the diagram (fig. 2) given below. The power factor in the primary circuit (f_1) is the cosine of the angle B A C. In practice f_1 may be taken as unity for all loads greater than a tenth of the maximum, and f_0 is generally about 0·8.

Let A C (fig. 2) equal E_1, the applied E.M.F. at the primary terminals. Let A B equal C_1R_1, the E.M.F. necessary to drive the primary current C_1 through the primary resistance R_1, and let B C equal the back E.M.F. caused by the magnetic flux in the core of the primary. These three forces form the triangle A B C, and the angles of this triangle are defined as the phase differences between these E.M.F.'s. Since A B is very small compared to A C, the angle B C A is very small, and B C and A C are practically equal to one another. Produce C B to D and make B D $=\frac{n_2}{n_1}$ B C, then B D will be the E.M.F. generated in the secondary coil. If V_2 be the pressure at the terminals of this coil and R_2 its resistance, then B D $=V_2+C_2R_2$. Fig. 2 is the fundamental diagram of

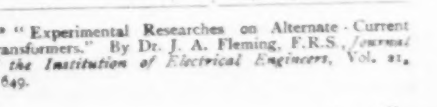

Fig. 2.

a transformer and deserves the most careful study. By trigonometry we can deduce the following formulæ from this figure:—

$$V_2=\frac{n_1}{n_2}V_1-\frac{n_2^2}{n_1^2}QC_2 \quad \ldots\ldots\ldots (2)$$

$$\text{where } Q=R_1+R_2\frac{n_1^2}{n_2^2}$$

Also the efficiency ϵ of the transformer when the power taken by the primary is W_1 watts is given by

$$\epsilon=\left(1-\frac{QW_1}{V_1^2}\right)\left(1-\frac{W_0}{W_1}\right) \quad \ldots\ldots (3).$$

W_0 being the power taken by the primary at no load—*i.e.*, the watts required to magnetise the transformer.

The following examples illustrate the great accuracy of these formulæ:—

(1.) In a Ferranti 20-h.p. transformer $R_1=2{\cdot}75$ ohms, $R_2=0{\cdot}0061$ ohms, $n_1=1{,}200$, $n_2=50$, and $E_1=2{,}400$.

In this case $Q=R_1+\left(\frac{1{,}200}{50}\right)^2R_2=6{\cdot}26$.

Hence $V_2=100-0{\cdot}111C_2$.

For example, when the secondary is supplying 50 amperes, the pressure at the secondary terminals is

$$100-0{\cdot}011\times 50=98{\cdot}35.$$

In practice the maximum permissible load on the transformer is reached when the secondary pressure drops 2 per cent., hence by (2) the smaller Q the greater the power the transformer will convert.

(2.) In a Swinburne "Hedgehog" transformer $Q=16{\cdot}3$, $W_0=151$, and $V_1=2{,}400$. The efficiency at any load W_1 is therefore

$$=\left(1-\frac{151}{W_1}\right)\left(1-\frac{16{\cdot}3\,W_1}{5{,}760{,}000}\right)$$

by formula (3).

The following table compares our calculated efficiencies with the efficiencies as actually measured by Dr. Fleming.*

Watts taken by primary (W_1)	469	1,804	2,553	3,632	4,571	5,297
ϵ determined by Dr. Fleming	0·87	0·92	0·94	0·95	0·96	0·97
ϵ calculated by (3)	0·86	0·91	0·94	0·95	0·96	0·96

* "Experimental Researches on Alternate-Current Transformers." By Dr. J. A. Fleming, F.R.S., *Journal of the Institution of Electrical Engineers*, Vol. 21, p. 649.

If we join the terminals A and C (fig. 1) by a piece of wire, and connect A and B to the mains, then the electric pressure between B and D is the difference between the primary and secondary pressures. If V be this pressure, V_1 the pressure between the mains, and V_2 the pressure between C and D, then

$$V = V_1 - V_2 = \frac{n_1 - n_2}{n_1} V_1.$$

Similarly, if we join the terminals A and D (fig. 1), and connect A and B to the mains, then the pressure between B and C will be the sum of the primary and secondary pressures, and will therefore be equal to $\frac{n_1 + n_2}{n_1} V_1$.

When a transformer is used in this manner it is called a "booster," and it can be used either for raising or lowering the pressure.

Another method of connecting up the transformer is to join B and C, and connect A and D on to the mains. In this case the pressure between A and B is $\frac{n_1}{n_1 + n_2} V_1$, and between C and D it is $\frac{n_2}{n_1 + n_2} V_1$. Mains may be taken off A and B to supply apparatus at the pressure $\frac{n_1}{n_1 + n_2} V_1$, and another set of mains may be taken off C and D to supply a circuit at the pressure $\frac{n_2}{n_1 + n_2} V_1$. A transformer used in this manner is called a compensator, and in many cases great economy can be obtained by its use. Professor Elihu Thomson has used this system in America for distributing electrical energy. For example (fig. 3), we can have an

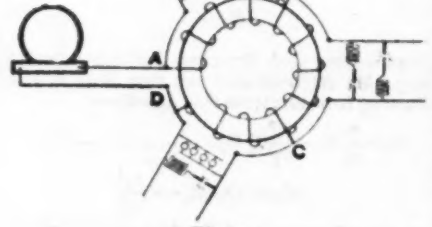

Fig. 3.

alternator feeding a compensator at A and D at 600 volts, and three circuits, A B, B C, and C D, taken from this compensator, feeding circuits at 200 volts. Even when there is no load on two of the circuits the voltage is still kept at 200 on the third. The reason of this can be explained in the same way as we explained the action of the transformer, for we can show that the magnetic flux inside the iron core remains constant no matter what the loads on the various circuits are.

Suppose that we have a transformer (fig. 1) with thirty turns of wire on the primary coil and twenty turns on the secondary, and that the pressure of supply is 100 volts, then by connecting this on to the mains we can get nine different pressures. Using it as a transformer we get 150 volts one way and 66·7 the other. Boosting up we get 250 or 167 volts. Boosting so as to reduce the pressure we get 50 or 33·3 volts. Finally, using it as a compensator, we get 60 or 40 volts. Hence, counting the original 100, we get in all nine different voltages.

In practice, however, we generally want to connect it up permanently, and the question arises, which is the most economical way of transforming the pressure? It can be proved that if we wish merely to lower or increase the pressure by less than 50 per cent., then to connect the transformer as a booster is the most economical way. If the pressure has to be altered by more than 50 per cent., then we use an ordinary transformer. If we wish to subdivide the pressure into several different circuits, then it is always best to use a compensator.

The apparatus hitherto described for altering the pressure of alternating currents has no rotating parts in it. We could, however, use an alternating current motor-generator, *i.e.*, an alternating current motor directly coupled on to an alternator, or we could use an alternating current dynamotor, *i.e.*, a motor-generator in which both the motor and alternator windings are on one armature, the current being supplied to the motor windings from two slip rings on one side of the armature, and given out from two slip rings on its other side. A piece of apparatus of this nature is called a rotary converter. As the efficiency of transformers is so high rotary converters are not used for converting alternating current at one pressure into alternating current at another, but they are largely used for converting direct current into alternating or *vice versa*. In order to do this the only change necessary is to provide a commutator instead of two of the slip rings on one side (fig. 4).

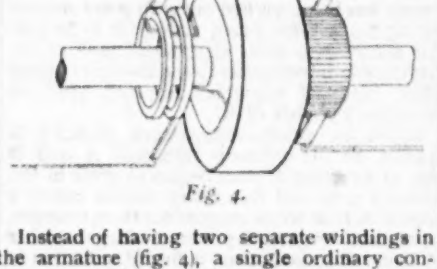

Fig. 4.

Instead of having two separate windings in the armature (fig. 4), a single ordinary continuous winding can be used, the collector rings for the alternating current being connected to two opposite points on this winding. The armature windings will thus carry both an alternating and a direct current, each of which heats the armature conductors exactly as if the other were absent. In rotary converters no lead has to be given to the brushes, just as in dynamotors, and the mechanical strains on the armature are very small.

Rotary converters are largely used in electric traction work. The alternating current from the power station is transformed by their means into direct current at a sub-station, and this direct current is conveyed to the trams by a trolley wire at a pressure of 500 volts. They are in use at the Central London Railway, and have been used for the Dublin electric tramways for several years. They are also largely used abroad. In the Central London Railway each rotary can convert 1,200 h.-p. received in the form of alternating current and pressure into over 1,100 h.-p. given out in direct current and pressure.

GENERAL BUILDING NEWS.

CATHOLIC CHURCH, TRANMERE, CHESHIRE.—The new Church of St. Joseph, in Devonshire-park, Higher Tranmere, was opened on the 19th ult. The building is of red Ruabon brick and terra-cotta, and accommodates 700 persons. Mr. Edmund Kirby was the architect and Mr. Peter Rothwell the builder.

CATHOLIC CHURCH, LOWESTOFT.—The foundation-stone was laid on the 23rd ult. of a Catholic church to be erected on a site in Gordon-road. The building will be of red brick, with Cossey dressings, and will accommodate 600 persons. The length will be 116 ft. and the width 53 ft. The nave will be 22 ft. and the aisles 13 ft. in width. The architects are Messrs G. & R. Baines, of London, and F. W. Richards, of Lowestoft. Messrs. G. Hawes & Son, of Norwich, are the builders.

METHODIST CHURCH, LOSTWITHIEL, CORNWALL.—Lostwithiel Free Methodist Church has been erected at a cost of 2,500*l*. The blocks of buildings consist of new chapel and the original schoolroom with new front, the two being connected by new classrooms. A lobby on each side gives entrance to the chapel. One entrance is surmounted by an hexagonal tower, the dome being covered with copper. The tower is flanked on each side with a turret, one being over the opposite chapel entrance and the other over the schoolroom lobby. The front windows of the chapel and the orchestra are of ornamental cathedral glass in leaded lights, the lower light of the front being painted. The interior provides seating accommodation for about 350, arranged on ground floor and gallery. A recessed orchestra will accommodate choir and organ. A high-pressure hot-water apparatus has been fixed. Mr. Samson Hill, Redruth, is the architect.

RESTORATION OF ORFORD CHURCH, SUFFOLK.—This church has just undergone restoration. The work was carried out by Messrs. Cornish & Gaymer, of North Walsham, Mr. J. T. Micklethwaite having been consulting architect.

ST. NINIAN'S CHURCH, ABERDEEN.—The Church of St. Ninian at Mile End will be dedicated on the 5th inst. The church covers an area measuring 63 ft. by 120 ft. The front is to Mid Stocket-road. On either side of the main entrance is a projecting buttress. A square tower rises on the south-west corner to a height of 53 ft. from the ground level, and this is crowned by a short pyramidal spire with a weather-vane terminal. The exterior masonry is entirely of granite from Rubislaw Quarries. Entering by the main doorway, side doors with leaded glass panels give access on either side to a tiled vestibule. The chancel arch has a span of 25 ft., and its apex is 29 ft. 7 in. from the floor. The pews and most of the interior finishings of the church are of pitchpine. The west gallery has a panelled front, and is supported in the middle by two pitchpine pillars, with capitals of carved foliage. The chancel has a tiled floor, which is reached by four granite steps rising from the nave. The walls are panelled with oak to a height of about ten feet. In the centre of the north wall a stone platform is erected, on which the communion tables will be set, and immediately above is a carved oak canopy. The canopy is divided into four pendant panels, each panel being filled with tracery. The communion table, of oak, measures 7 ft. 6 in. in length. The pulpit, which is situated in the right side of the chancel, looking from the nave, is also of oak. All the carved woodwork is from the workshops of Messrs. J. and D. Ogilvie. All the walls of the interior of the church are lined with pitchpine to a height of about 5 ft. The church will be lighted throughout by electric light. The vestry, session-house, &c., are situated at the north-east corner of the building. The edifice has been designed and erected under the supervision of Messrs. W. & J. Smith & Kelly, architects. The contractors for the work were:—Mason work, Mr. John Morgan, Charlotte-street; joinery, Messrs. Hendry & Keith, Gilcomston Park; plastering, tiling, &c., Messrs. James Scott & Son, John-street; painting, Mr. Edward Copland, Rosemount Viaduct; slating, Mr. George Farquhar, Union Row; plumbing, Messrs. J. Blaikie & Sons, Littlejohn-street; lighting, the Aberdeen Electrical Engineering Company, Limited; heating, Mr. Robert Tindall, Loch-street; woodcarving and furniture, Messrs. J. & A. Ogilvie, Union-street. The total cost of the new church is between 5,000*l*. and 6,000*l*.

PARISH CHURCH, CARNOUSTIE.—The foundation-stone of Carnoustie Parish Church was laid on the 25th ult. The building will be of dressed stone from the Carmyllie quarries. Mr. P. M'Gregor Chalmers, of Glasgow, is the architect, and the contractors are:—For masonry, Mr. George Robertson, Carnoustie; joinery, Messrs. Miller & Fleming, Glasgow; slating, Mr. Alexander Hogg, Carnoustie; plumbing, Mr. Joseph Anderson, Carnoustie; glazing, Mr. N. M'Dougald, Glasgow; and ironwork, Mr. Andrew M'Call. Mr. Thomas Neill is the clerk of works.

PRIMITIVE METHODIST CHURCH, HARTON, DURHAM.—On the 18th ult. the foundation-stone was laid of a new Primitive Methodist chapel in Wenlock-road, Harton Green-lane. Mr. T. F. Davidson, of South Shields, is the architect, and Messrs. Summerbell & Sons, Tyne Dock, are the builders.

SCHOOLS, SHEFFIELD.—On the 27th ult. the foundation-stone was laid of a new school, to be erected on a site adjoining the Primitive Methodist chapel, and to accommodate, at a cost of over 1,600*l*., between 350 and 400 teachers and scholars. The architect for the new schools is Mr. W. Wray, of London, and the premises comprise one large room on the ground floor, with ten or twelve classrooms above. Mr. Hancock is the contractor.

BOARD SCHOOL, BRIDGE OF WEIR, RENFREWSHIRE.—A new school, which has been erected at Bridge of Weir by the Kilbarchan School Board, was opened on the 25th ult. The building consists of a central hall, surrounded by six classrooms. The central hall has an open timber roof. The classrooms accommodate from twenty to fifty children each. The architect was Mr. James Miller, of Glasgow.

NEW BLOCK, BANFFSHIRE ASYLUM, LADYBRIDGE.—The following tenders have been accepted:—Masonry, David Forsyth, Elgin; carpentry, James Dey, Botriphnie; plastering, Sellar & Co., Aberdeen; slating, John Hutcheson, Banff; iron and smith work, Thomas Paton, Banff; painting and glazing, Charles Innes & Co., Banff. The accommodation is for fifty male patients, and the total estimated cost, 3,900*l*. Mr. W. Kelly, of Aberdeen, is the architect.

RECONSTRUCTION OF ABERDEEN MUNICIPAL BUILDINGS.—These buildings are to be reconstructed from designs by Mr. R. G. Wilson, architect, Aberdeen, at a total cost of about 20,000*l*. The Broad-street front will be set back to the line of the great tower, so as to widen the street at that place, and correspond as far as possible with the proposed widening in front of Marischal College and the new Greyfriars Church, extending from Queen-street to Littlejohn-street. The reconstructed buildings will extend across Concert-court, and include rebuilding of the house beyond, so that a new access will have to be provided for the Advocates' Hall and Library (in Concert-court). It is expected the work will be commenced in six or eight weeks, the various departments having now agreed as to the accommodation they respectively require.

HOTEL, BRAY, DUBLIN.—Breslin's Royal Marine Hotel, Bray, which some time ago became the property of the Dublin, Wicklow, and Wexford Railway Company, was opened on the 18th ult. after reconstruction. The building has been renamed the

Station Hotel. Mr. J. J. Farrell was the architect. The contractors for the building work were Messrs. Meade & Son, and Messrs. Keatinge & Son executed the painting and decorative work.

POST-OFFICE, HAMILTON, LANARKSHIRE.—A new post-office is in course of erection in Brandon-street, Hamilton. The cost is estimated at 5,000*l.* Mr. W. W. Robertson, H.M. Office of Works, Edinburgh, is the architect, and Messrs. Miller & Ferguson, of Motherwell, are the builders.

FREEMASONS' HALL, OKEHAMPTON.—The corner-stone of a Freemasons' Hall was laid at Okehampton on the 27th ult. The building will cost about 700*l.* Mr. J. Archibald Lucas, of Exeter, is the architect.

HOME OF REST FOR CRIPPLES, BANGOR, BELFAST.—The foundation-stone of the Stewart Memorial Home for Cripples at Bangor, near Belfast, was laid on the 25th ult. The home is intended principally for children. On the ground floor will be a wing with separate wards for boys and girls, and nurses' room, giving accommodation for those unable to go up and down stairs. There will be a common day-room, with large bays. On the upper floor wards, with nurses' rooms attached, will be provided. The building will accommodate thirty visitors. Mr. W. J. W. Roome is the architect, while the builder is Mr. James Kidd.

TIVOLI VARIETY THEATRE.—In view of the ninth anniversary of the opening of the Tivoli Variety Theatre, various alterations have lately been made in the building. The buffet, between the main entrance hall and the Tivoli Restaurant, has been merged into the theatre, and the space utilised in making a grand entrance hall, 30 ft. by 17 ft., and a vestibule 27 ft. by 9 ft. Additional exits have also been made direct into the Strand. In the centre of the new entrance hall and vestibule ornamental arches have been formed, and this work, which is in the Indian style, harmonise with the other decorations. The doors leading to the grand circle, which formerly extended several feet into the auditorium, have been brought in line with the entrance hall. A new box office and "gentlemen's cloakroom" have been formed, and the "ladies' cloakroom" enlarged, remodelled, and redecorated. The grand circle saloon is newly decorated in the style of Louis XVI., and the ventilation improved by adding an alcove, with a window opening direct into the open air, whilst an air-shaft has been carried above the roof. Electric fans are fitted at each end of this saloon, one bringing in fresh air and the other expelling the hot air. A glass awning has been fixed over the new entrance, which, with the other improvements, will secure greater comfort to the public frequenting the hall. These alterations have been carried out under the direction of the architect, Mr. Walter Emden. The structural works have been executed by Messrs. Howard & Co., and the glass awning by Emanuel & Co. The decorations are the work of Mr. J. M. Boekbinder.

WELLINGBOROUGH COTTAGE HOSPITAL.—On the 25th ult. the Cottage Hospital, Wellingborough, was opened. The building is located on the Doddington-road. The plans for the building were prepared by Messrs. Sharman & Archer, and the contract of Messrs. E. Brown & Son (2,140*l.*) having been accepted a start was made with the building last autumn. The hospital proper consists of two six-bedded wards, with rounded ends, extreme length 29 ft. and width 20 ft., forming the wings of the building, with lavatory accommodation in connexion with each ward, but isolated by a cross-ventilated lobby. The intervening central block contains a hall, small separation ward, bathroom, an operating-room, lighted both from the roof and side, and drug and linen stores, the roof having been made to serve the purpose of a general storeroom. In the centre of the building on the garden front is an open verandah, 40 ft. long and 7 ft. wide, affording shelter and shade for convalescent patients. The floors throughout, excepting in the operating-room and lavatories, are of pitchpine blocks on cement concrete. Each of the principal wards is heated by a central warm fresh air stove with descending flue, and hot and cold water is laid on to each lavatory and sink and to the bath. The administrative block, which is placed between the Doddington-road and the hospital, and connected with the latter by a glazed covered way, contains on the ground floor: Matron's sitting-room, nurses' dining-room, kitchen, scullery, larder, china pantry, and hall, and opening from the courtyard adjoining are a wash-house, laundry, coal place, and disinfecting chamber. The first floor accommodation consists of matron's and four nurses' bedrooms, with bathroom, lavatory accommodation, and linen store, all opening on to a central landing. The buildings throughout are of brick, with Sileby brick facings and pebble-dashed cement panels in the upper part, stone being used only for a canopy and dressing at the front entrance and at the courtyard doorway. The roofs are of steep pitch, and are covered with Broseley tiles, the hospital having overhanging eaves, and the house moulded and enriched cornices.

BUSINESS PREMISES, ANNAN, DUMFRIESSHIRE.—A block of business premises, to be known as Regent House, has been erected at the corner of High-street and Bank-street, Annan. The upper portion of the building is of polished sandstone, and rests on iron girders and pillars. At the angle of the building bay windows are formed and these are surmounted by a double deck open circular turret, the top being 55 ft. high. The principal entrance is beneath these projecting bay windows, but there are also entrances from the two streets. The building, which will be occupied as a drapers' and outfitters', has four floors and a basement. The drapers' department, on the ground floor, is 46 ft. long, the shop windows being of plate-glass. The exterior and interior fittings are of polished mahogany. A milliner's shop is situated at the west-end of the block, in High-street. On the first-floor, access to which is by a staircase of pitch-pine and mahogany, are situated the show rooms, &c. The second floor is occupied by work rooms. The third floor contains work rooms, stock rooms, &c., part of this floor being let as a photographer's studio, with a separate entrance from High-street. The architect was Mr. T. Taylor Scott, of Carlisle, under whose supervision the work was carried out by the following contractors.—Masonry, Mr. G. M'Ildowie, Annan; joinery, Mr. E. Musgrave, Carlisle; slating, Mr. J. Richardson, Annan; plastering, Mr. J. Laidlaw, Ecclesfechan; plumbing, Messrs. J. Dickson & Son, Dumfries; painting and glazing, Mr. William Irving, Annan; heating, Messrs. Musgrave & Co., Belfast. The lead lights were supplied by Messrs. Swain, Bourne & Son, Birmingham, and the mosaic tiles by Messrs. Carter & Co., Poole. Mr. Douglas, of Newcastle, executed the carving.

BANK BUILDINGS, CONSETT, CO. DURHAM.—The new premises erected at Consett for Messrs. Lambton & Co., Bankers, of Newcastle-on-Tyne, have just been opened for business. They comprise bank, manager's room, and strong-room in basement, house of ten rooms for manager, and in the back portion of the site three shops and dwelling-rooms over. The walls are faced with Penshaw pressed bricks, and the stone for cornices and dressings is from the Penshaw quarries. The banking-room and manager's room are fitted up entirely in oak. The general contractor has been Mr. C. Groves, of Chester-le-Street, and the strong-room doors are by Messrs. Chatwood's Safe Company, Limited. The buildings and fittings have been designed by, and erected under the superintendence of, the architect to the bank, Mr. John W. Dyson, Newcastle-on-Tyne.

TEMPERANCE HALL, HUDDERSFIELD.—A new hall is to be erected in Princess-street, Huddersfield, for the local temperance society. The memorial stone was laid on the 25th ult. Mr. B. Stocks, of Huddersfield, is the architect.

SANITARY AND ENGINEERING NEWS.

WATER SUPPLY, SELKIRK.—The Selkirk Town Council have adopted a scheme, prepared by Mr. Harry W. Taylor, of Newcastle-on-Tyne, for a new water supply for the burgh. The cost will be about 12,500*l.*

SEWAGE SCHEME, BELPER, DERBYSHIRE.—A Local Government Board inquiry was held on the 24th ult. in the Council Room, Belper, into an application by the Urban District Council for sanction to borrow 48,144*l.* for the construction of a sewage scheme for the town. The inquiry, which was conducted by Mr. Percy Boulnois, was attended by the engineer for the scheme, Mr. Lomax, of Manchester.

FOREIGN.

FRANCE.—In connexion with the Paris Exhibition, and at the proposal of the Minister of Fine Arts, the Grand Cross of the Legion of Honour has been promised to M. Hébert (painter) and to M. Guillaume (sculptor); the rank of "Grand Officer" to M. Gérôme and M. Carolus-Duran (painters) and to M. Fremiet (sculptor); and that of "Commander" to MM. J. P. Laurens and Roll (painters), M. Ernest Barrias (sculptor), and M. Vaudremer (architect). Among the new "Officers" of the Legion of Honour are M. Alfred Normand (architect), M. Bartholome (sculptor), and M. Roybet (painter). Among the new "Chevaliers" are M. Tournaire and M. Defrasse (architects).——The competition for a school of industrial work, to be erected at Marseilles, has been decided in favour of the design by MM. Pacaud and Cravio.——The jury in the competition for a group of schools for the municipality of Havre has awarded the first premium to M. Poupel; the second to M. Charles, and the third to M. W. Cargill; all of Havre.——A committee has been formed to erect a monument to Du Guesclin at Dinan.——The death is announced, at the age of eighty-three, of M. Cauvin, painter, who for many years was instructor in painting, sculpture, and drawing at the naval arsenal of Toulon, to which he has left an interesting collection of models of the poops of ancient ships, some of them after designs by Puget. ——We have to announce also the death, at the age of forty-four, of M. Camille Gâté, sculptor, author of the monument to the poet Remi-Belleau on the Place de Nogent-le-Rotrou; that of M. Francis de Saint-Vidal, a sculptor who studied under Carpeaux, and executed the monumental fountain under the Eiffel Tower and the statue of De Neuville on the Place de Wagram; and that of M. Pucey, architect and member of the Societe Centrale, and who was general secretary of the "Société des Ingénieurs et Architectes Sanitaires" of France.

MISCELLANEOUS.

ABERDEEN CORPORATION TRAMWAYS.—With reference to the new tramway extensions authorised by private Act of Parliament, Aberdeen Town Council has resolved that the tramway from Castle-street to the sea-bathing station should first be proceeded with, on the overhead trolley system; that the section of the existing tramway in Union-street between St. Nicholas-street and Castle-street be electrically equipped on the same system; and that tenders be invited for 800 tons of steel rails, 10,000 tons of causeway setts, and the necessary poles. It was also agreed to ask a quotation from the Westinghouse Electric Company of the cost of electrically equipping the tramway in Union-street on the underground system. It is desired by the Town Council that the line of building of the new post-office be set back from 8 ft. to 10 ft., in Crown-street, so as to allow of a double line of tramway rails, but the Post Office authorities have not yet agreed to this.

LAYING OUT NEW STREETS.—A special general meeting of the Association of Borough Officials of Scotland was held on the 24th ult., in the Sheriff Courthouse, Elgin, Lord Provost Young, of that city, presiding. In the course of the proceedings Mr. F. G. Holmes, C.E., Borough Surveyor, Govan, read a paper on "Laying Out New Streets," in which he contended that in all towns and boroughs a system of well-designed, broad, and regular streets is necessary, and that Borough Commissioners should have their powers extended. He held that Commissioners should have the power to regulate the lines as well as the levels of proposed new streets. In towns the width should not be less than 80 ft. for carriageways and footways, unless in short streets which could not be extended, or in other exceptional circumstances. Where tramways, &c., were contemplated, 60 ft. was required, which would be an ample minimum for all modern requirements for streets in general. In some of our cities, he said, they had instances of streets 70 ft., 80 ft., and 100 ft. in width, and it was to be regretted that these widths were not more frequently adopted. Mr. W. F. Mackintosh, clerk, Arbroath, having read a contribution on "Legal Procedure in Making Streets," both papers were discussed together, and several members supported the view that commissioners should have power to acquire land for the purpose of improving and widening streets. Mr. James Campbell, Town Clerk, Saltcoats, read a paper on the "Cost of Compulsory Acquiring Ground for Public Purposes," urging that the Borough Police Act should be brought into line with the Public Health Act. A discussion also took place as to where the line should be drawn, as to new erections with reference to the lodging of plans with Deans of guild or commissioners.

DRINKING-FOUNTAIN, KENSINGTON.—A drinking-fountain is to be erected in the High-street, Kensington, from a design by Mr. Herbert W. Mackinney. The fountain will be of Portland stone on a hard York stone step. The work is being executed by Mr. G. Hawkins, of Shepherd's Bush.

REFUSE DESTRUCTOR, HARTLEPOOL.—The refuse destructor at Hartlepool was opened on the 22nd ult. The destructor consists of six cells, capable of dealing with sixty tons of refuse in twenty-four hours. The contractors were as follows:—Messrs. Goddard, Massey, & Warner, Nottingham, for the destructor cells, blowers, and machinery; and Mr. R. J. Marshall, of Hartlepool, for the buildings, chimney shaft, boundary wall, and house. The whole of the work was executed under the superintendence of the Borough Engineer, Mr. H. C. Crummack. The cost was over 5,700*l.*

THE HOUSING QUESTION, WOOLWICH.—In consequence of the activity in Woolwich Arsenal and the influx of so many additional families, the scarcity of houses in the district has become acute, and a demonstration was held on Saturday last week to discuss the remedy. A procession perambulated the different streets in the neighbourhood, ultimately wending their way to Plumstead Common, where an open-air meeting was held. Mr. Alfred Hall, of the Woolwich District Trade and Labour Council, presided, and said the meeting was the outcome of a conference of all the organised bodies of the district, convened by the Woolwich District Trade and Labour Council, who were fully convinced that the time had arrived for the working classes to do something for themselves in the way of better house accommodation. Mr. J. Steer moved the first resolution, as follows:—"That this meeting of trade, labour, co-operative, temperance, friendly, and other working-class societies of the Woolwich district calls upon the Government to take steps without delay to find housing accommodation for the military at present residing in private houses, to assist local bodies to build municipal dwellings by granting cheaper loans for housing purposes, and to check excessive rents by the establishment of fair

rent courts. This meeting also calls upon the London County Council to make greater use in the near future of their powers to assist in housing the people by increasing the supply of houses, independently of dealing with slum areas." House jobbers from London, he said, were taking advantage of the scarcity of houses in the district by buying up all they could and immediately raising the rents. Mr. A. Allison seconded the resolution, which was supported by Mr. F. Knee, Secretary of the Workmen's Housing Council, and carried. Mr. J. T. Brownlie, Chairman of the Educational Committee, Royal Arsenal Co-operative Society, moved the second resolution :—"That this meeting of working men and women of Woolwich district resolves not to support any candidate at the Borough Council election who will not definitely promise to urge the adoption of Part III. of the Housing Act, 1890, and the speedy erection by the Council of good houses for the people in sufficient numbers to bring down rent, and to be let at rents which will suffice to meet the necessary cost of construction and maintenance." Mr. Charles Martin seconded, and Mr. James Walsh, President of the Iron Plate-workers, supported the resolution, which was also carried.

LEEDS MASTER BUILDERS.—The annual meeting of the Leeds Master Builders' Association has elected Mr. J. T. Wright President, and Mr. J. Pickard Vice-President. The report and balance-sheet were adopted. The retiring President (Mr. W. H. Dews) and the various committees of the organisation were thanked for their services.

TRADE NOTES.—The new workhouse infirmary, Wellingborough, is being warmed and ventilated by means of Shorland's patent Manchester stoves with descending smoke flues, &c. The same are being supplied by Messrs. E. H. Shorland & Brother, of Manchester.——The heating of the Shirehall, Hereford, has been placed in the hands of John King, Limited, engineers, Liverpool, who are employing their improved hot-water heating apparatus combined with ornamental "Rahnee" radiators. The Working Lads' Institute, Whitechapel, London, has lately been fitted with hot-water heating apparatus by the same firm. —— We stated last week that a tobacco factory has been erected at Liverpool for Messrs. Ogden. We omitted to mention that Messrs. Robert Dawson & Co., Limited, of Stalybridge, are erecting there a large heating and ventilating installation. The arrangements comprise a combination system of direct heating in conjunction with a system of mechanical heating and ventilation.

DUBLIN ELECTRIC LIGHTING.—At a meeting of the Dublin Corporation on the 28th ult. it was decided by a majority of thirty-eight to fourteen to carry out the electric lighting of the city as a municipal concern instead of accepting the proposals of the Electric Tramway Company.

BUILDINGS COLLAPSE AT TOTTENHAM.—A portion of some new buildings known as Vicarage Mansions, which are in course of erection at West Green, Tottenham, collapsed on the 28th ult., and three bricklayers, named Hodge, Howard, and Woolard, who were engaged on the works, were precipitated to the ground, a distance of 50 ft. They were more or less injured, and were conveyed to Tottenham Hospital.

SALE OF A SCOTTISH HISTORICAL RUIN.—There was sold at Edinburgh on Monday the remains of the interesting historic house in the ancient and Royal burgh of South Queensferry, on the Firth of Forth. It is a dilapidated, red-tiled building, and is known as Queen Margaret's Palace, and also as the Covenanter's House. The former name it owes to its supposed association with Queen Margaret, the grand niece of Edward the Confessor, and wife of Malcolm Canmore, who succeeded Macbeth on the throne of Scotland. The building is in the vicinity of the Bink's Rock, the old landing-place of the ferry used by Malcolm Canmore and his Queen in their journeyings across the Forth, and, according to tradition, it was made use of by the "Saintly Queen" of Scotland when storm-stayed on her way from Edinburgh to Dunfermline. Unfortunately, however, it is very doubtful, to say the least, whether the present building, or any portion of it, was in existence in the eleventh century. Indeed, it seems to belong to the early part of the seventeenth century. But the ground on which it stands was part of the ground conveyed by Malcolm Canmore, at the instigation doubtless of his pious wife, to the Abbots of Dunfermline, who again gave it to the Carmelite Friars. According to one of the traditions of Queensferry Mary Queen of Scots passed a night in the "palace" after her escape from Lochleven Castle. There is, however, little ground for the tradition. The name, "The Covenanters' House," by which the building is also known, rests on a surer foundation than the higher title. In the seventeenth century the building was the principal hostelry in the town. To it came two fleeing Covenanters seeking refuge. They were tracked, however, by their pursuers, and one of them was killed on the staircase while assisting his companion to escape. The Covenanter who was killed was Henry Hall, of Haughhead, and on his person were found the famous "Queensferry Papers," which the authorities afterwards caused to be printed and circulated throughout the country. The building occupies about 45 ft. by 30 ft. of ground, and consists of three stories—a ground flat and three flats above. About fifteen years ago it was condemned as unfit for occupation, and since then it has been allowed to fall into a still worse state of dilapidation. Last winter the burgh authorities gave public notice that owing to the building having become "waste and ruinous and a receptacle for filth," application would be made to the Court for a warrant to sell it, failing its being put into a state of repair within three months. The owners, however, seem to have given up all right and interest in it. Warrant to sell was granted by the Court, the upset price being fixed at 20*l*. At the auction on Monday the building and ground were sold for 41*l*.—*Times*.

CAPITAL AND LABOUR.

SETTLEMENT OF PAISLEY PLUMBERS' STRIKE.—The strike of the operative plumbers of Paisley and district, which commenced about four months ago, has now been settled. The men struck work owing to the refusal of the masters to grant them an increase of ½d. per hour in accordance with that granted to the Glasgow operatives, who, they held, were paid on the same basis of agreement as the Paisley men. At a meeting of representatives from both sides, held on the 23rd ult., under the presidency of Mr. D. D. Dickie, solicitor, Paisley, the following agreement was arrived at :—(1) That the rules and regulations of the working time for Paisley of date November 1, 1897, shall be re-agreed to by the parties; (2) that the workmen shall return to their work on Monday morning, August 27, 1900, and that at the same rate of wages as formerly until the beginning of the year 1901; (3) that from and after the beginning of the year 1901 until May 1, 1901, the masters shall give the workmen an advance of ½d. per hour; and (4) that from and after May 1, 1901, until May 1, 1902, the same advance of ½d. per hour shall be continued.

THE EDINBURGH AND LEITH MASONS.—While this struggle continues, batches of men are daily sent to different towns in England and other parts of Scotland. There is not the slightest sign of either side giving way, and everything points to the strike extending for a much longer period yet. The few employers who are said to have yielded since the dispute began are not in any way affecting the main body of the masters, or brightening the prospects of the men. At a meeting of the Master Masons' Committee, held on the 27th ult. in the Building Trades Exchange, Shandwick-place, reports, it appears, were presented to the effect that many of the men were returning to their work on the masters' terms, and that some employers had now got as many men as they required. It was also reported that owing to the united action of the Edinburgh and Glasgow masters, the boycott enforced by the men on an Ayrshire job being carried on by an Edinburgh contractor had now been removed, and the job supplied with men. Notice was taken of the fact that during the last ten years or so the masons had asked and received an increase of pay five times owing to the briskness of trade, and that now, when trade was dull and notice of a reduction of wages was given, the masters were forced into a fight, which was now running into its twelfth week. The masters declare themselves convinced that equity and right are on their side, and say they are as determined as ever to fight the strike out to a successful issue.—*Scotsman*.

GREENOCK HOUSE JOINERS.—A fortnight ago the joiners in the employment of Mr. A. Stevenson, to the number of over twenty, struck work on account of a machinist being employed who was not a joiner. The masters met, and agreed that should the men not return to work, a general lock-out would take place. On the 27th ult. a meeting of the men took place, Mr. Turnbull presiding. Mr. Galloway, Glasgow, addressed the men. After discussion, it was agreed that a deputation of the employees should meet the masters to discuss the matter under dispute.

LEGAL.

LEEDS LIGHT AND AIR CASE.

THE case of Hustler *v.* Fornsworth came before Mr. Justice Farwell, sitting as Vacation Judge, on the 29th ult., on a motion by the plaintiff for an interim injunction restraining the defendant from erecting a building at Leeds so as to obstruct the light and air coming to the plaintiff's premises.

Mr. Badcock, Q.C., in support of the motion, said that the plaintiff's shop was a furniture shop at Leeds. This building formerly had opposite to it a quite low building of about 20 ft. high. The defendant had recently bought the site on which the building stood, and pulled it down, and proposed to erect a building of 30 ft. high on the site, which would substantially interfere with the access of light and air to the plaintiff's premises.

Mr. Birrell, Q.C., for the defendant, said his client's case was that the damage done to the plaintiff was of so slight a character that no Court would grant an injunction.

In the result the motion, by consent, was ordered to stand till the trial, the defendant consenting that the motion should be treated at the trial as if the buildings were then in the condition in which they now are. Accordingly no order was made on the motion except that costs should be made costs in the action.

FOLKESTONE LIGHT AND AIR CASE.

THE case of White *v.* Flude came before Mr. Justice Farwell in the Vacation Court on the 29th ult., it being an application by the plaintiff for an interim injunction to restrain the defendant from erecting a building in Victoria-grove, Folkestone, so as to diminish the light and air coming to the plaintiff's building.

It appeared from the statement of Mr. Cave, who appeared in support of the motion, that the defendant was proposing to erect a mission hall on the site on which formerly stood a cottage about 20 ft. high, but which had lately been pulled down. The plaintiff's case was that the Mission-hall proposed to be erected by the defendant, according to the plans, was to be about 28 ft. high, which would materially diminish the light and air coming to one of the plaintiff's windows in a workshop and also another window which was a basement window facing the garden. For the purposes of the motion the defendant admitted that the plaintiff's lights were ancient.

Mr. Alexander, Q.C., for the defendant, said that the highest point of the mission hall would be about 25 ft., and contended that it was not a case for an interim injunction.

In the result his Lordship thought it was a case in which there was not sufficient evidence to justify his interfering in the way suggested. He was of opinion that the better plan would be to have the case referred to an architect.

The application was accordingly dismissed.

RECENT PATENTS:

ABSTRACTS OF PATENTED INVENTIONS.

8,854.—CLUTCHES: *H. H. Bean*.—Linked toggles pivotted upon a sliding sleeve press the discs which are mounted upon a feather on one shaft against the sides of a drum that is keyed upon the other shaft, and the pressure is maintained with springs; the side of the drum, screwed into its place, is adjusted for taking up wear, and is locked with a screw through its periphery, which is also in engagement with one of a set of notches cut at its edge.

8,883.—DRESSING SLATES: *G. Watson*.—The revolving knives used for dressing slates are covered with a guard of openwork or transparent material, which consists of a hinged or removable panel to which is attached wire netting in a curved or other suitable shape.

8,912.—ORNAMENTAL WOOD-BLOCKS: *W. H. Aston*.—A block is fashioned by glueing together slabs or plates of differently-coloured woods. It is then cut along the wood's grain into fresh plates which are glued together so as to form a new block, which, in its turn, is cut across the grain into parquetry slabs or sheets. In order to absorb the moisture of the cement or glue, to mark the divisions, and to prevent shrinkage of the finished work the inventor lays sheets of coloured paper or cloth between the plates as they are being glued together.

8,926.—MITRING MACHINES: *Steel Nut and Joseph Hampton, Limited, and S. Hampton*.—The cutters are mounted upon a radial arm which is pivotted on to a downward extension of the frame; the arm's end passes through a curved slot, and has a washer that presses against the frame's back in order that the cutter may be kept close to the face; the knife, which may be in one piece or in two, is joined with shouldered set-screws to the radial arm; a stud, together with the edges of the opening, supports the moulding, &c., that is to be mitred.

8,944.—COMPASS, DIVIDERS, AND CALLIPERS COMBINED: *W. C. Day*.—The legs, bent at an obtuse angle, are grooved on their outsides that they may take divider-legs, a compass pencil, or calliper-legs, fastened with set-screws, and are pivotted with ears and screws on to a block from which hangs a sleeve for guiding a vertical rod; the legs are joined to a socket which slides upon the rod by links. For purposes of a fine adjustment one turns the milled head of a screw which passes into an internally-screwed bore in the vertical rod, whose rotation is prevented by means of a groove and a screw, and a pin which engages with a grooved collar retains the former screw in its place.

8,946.—STONE SAWING: *F. W. Shuttleworth & E. J. Bell*.—On to the squared ends of the side bars of the frame are fastened I-beams, to which the saws are secured by pairs of forked bolts. Each corner of the frame is supported with three rods that run upon wheels which are mounted upon the saddle, adjustment being allowed for by the mounting of the lower wheels upon an eccentrical bearing-pin. The saddles are adjusted vertically with screws, and move upon the corner-posts or dovetail slides, having an adjustable bearing-strip. The connecting-

rod is fastened to the end bar which is tied to the I-beam.

8,981.—FLUSHING APPARATUS: *F. W. Hancock.*—To the rocking lever's inner end is attached a link upon whose upturned end a ring works loosely within the enlarged inlet of the siphon. Under normal circumstances a disc rests upon the ring in such a manner than when the chain is pulled water flows over the siphon's crown, the disc rising to allow the ensuing flush to pass.

9,013.—FENCES, HURDLES, PALISADES, &C.: *L. Motley.*—The fencing is composed of parts which can be put together in a flexible form, so that upon an incline the posts will remain vertical whilst the bars will be parallel, more or less, to the sloping ground; holes in the horizontal bars take the droppers, on which are made stops that prevent their withdrawal from the bars when the fence has been put together; the bars are fastened to the standards with bolts, or with fish-plates that pass through the standards and are bolted to the bars.

9,028.—MANUFACTURE OF VARNISH: *S. Banner.*—The copal asphalt or gum is first fused and then linseed oil is added; when the mixture has been boiled it is allowed to cool to 240 deg.-270 deg. Fahr., when is added a hydrocarbon boiling slightly above that temperature, and the admixture is cooled; next is added a mixture of high and low boiling point hydrocarbons which have the required flash-point; the light hydrocarbon ensures a rapid drying of the varnish, whilst, as the compound has a sufficiently high flash-point, a quantity of low flash-point hydrocarbon may be employed.

9,036.—WINDOW SASHES: *F. C. Carey.*—The halves of the sashes, which are vertically divided, are hinged to sliding stiles in order that they may be turned inwards as may be required; sliding bolts secure the halves of the sashes together, the stiles—attached to the sash-weights—slide upon metal strips; the stiles are rabetted, tongued, and grooved for the exclusion of draughts and wet, and a metal tongue on the sill fits into a recess in the sash's bottom rail.

9,047.—APPARATUS FOR CLOSING GATES: *J. Holden.*—This consists of a cranked lever pivotted to the gate-post, and having an adjustable weight upon its one end; a cord or chain joins the lever's other end to an arm which is clamped upon the gate-bars; the gate becomes closed when the weight descends. Instead of the weighted lever a spring can be used.

9,147.—PROPS FOR PITS: *J. Green.*—For holding up and liberating pit props, which are mounted upon a chock block that slides within a metal box fitted with sliding or hinged doors and filled with coal dust or sand. When it is desired to free the prop the doors are opened, either from a distance or otherwise, whereupon the prop's weight forces the sand or dust out of the box.

9,165.—A THEODOLITE: *J. Hermann.*—When the instrument, which may be freely swung round and raised or lowered in a split socket of the tripod head, has been clamped after a rough adjustment, a slow angular movement is effected by means of a screw and a ball that turns within a cup affixed to a projection upon a socket and within another cup fashioned in that projecting piece; the ball-shaped nut at the screw's end is mounted so that it shall swivel in a bracket of the central axis. A table having a bevelled and graduated edge supports a bearing-cup whose socket is clamped to the socket which carries the table. For taking direct observations the bearing-cup is clamped to the table, but when it is desired to take an observation at a right angle to the direct line of sight the bearing-cup is liberated, and is then swung round through 90 deg. in either direction until its projection strikes a fixed stop upon the table. Accuracy of adjustment is shown upon a scale, cut in the cover that carries the spirit level, by means of index fingers upon the socket and the bearing plate. The engagement of a pinion upon the spindle of a milled head with a toothed sector, which is affixed to the telescope's clamping-band, provides for making a fine adjustment in altitude, whilst a fine adjustment in azimuth is effected by the engagement between a worm and a worm-wheel upon the double-conical spindle, to which is clamped the socket to which the telescope is adjustably secured.

9,171.—A PRESERVATIVE COMPOSITION: *H. E. Fulyan.*—A composition or paint for ships' bottoms or submerged structures is made from an admixture of cocculus indicus, red mercury oxide, creosote, lime, shellac, or other gums, and methylated spirit; for iron or steel structures iron oxide is added, and for wooden structures copper arseniate is added.

9,256.—METHOD OF TESTING COLOURS: *G. K. Henderson.*—For determining the proper constituent colours of any desired shade or tint three discs, coloured and graded from the lightest to the darkest shade of yellow, red, and blue respectively, are pivotted upon a common base, to which are also affixed three correspondingly graduated circles, the red and blue discs being of some transparent material, and the yellow disc of paper. The relative amount of colour that is needed for any particular shade is denoted by the index-figures of the discs, and any shade required may be obtained at the shade-registering point by turning the discs round.

9,295.—WATER-SUPPLY COCKS: *J. Milne and H. Cheshire.*—The inventors devise supply cocks that shall deliver mixed hot and cold water through alternative outlets. In one form the discharge is made through either one of two pipes; the hollow plug has two openings that register with the two inlets, an opening that registers with one of the outlets, and an open-ended recess which in one position places one of the two pipes in communication with the two inlets.

9,302.—METHOD OF MEASURING WOOD: *E. Kavanagh.*—For indicating the lineal or superficial feet of boards, &c., that are passed through a sawing or similar machine, a case is attached to the fence by means of a spring which forces a wheel against the board as it traverses the machine, and in the case is set a train of wheels with a registering dial. The size of the wheel is such that it shall record upon the dial the superficial feet in a 3-in. board. Wheels of different sizes are adopted for registering the area of boards of different heights.

9,337-8.—REMOVAL OF PAINTS, PREPARATION OF DISTEMPER: *R. H. Mercer.*—A composition for removing paint is made of hydrate of calcium, caustic soda, water, and dextrin or starch. A white distemper for rendering canvas, plaster, or wood, &c., washable and fire-resisting, is made of carbonate of lime, infusorial earth, silicate of potash, carbonate of barium, zinc oxide, and water. If it is to be used as a paint the mixture is made of carbonate of lime, powdered glass, infusorial earth, silicate of potash, sulphide of lead or zinc oxide, dextrin, and water.

MEETINGS.

SATURDAY, SEPTEMBER 1.

Architectural Association.—Summer Visit to Colney Chapel Convent, near St. Albans, by permission of the architect, Mr. Leonard Stokes.

WEDNESDAY, SEPTEMBER 5.

Builders' Foremen and Clerks of Works Institution.—Ordinary meeting of the members, 8 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 9.—By C. STRIDE (at Selsmore).

South Hayling, Hants.—Salters-lane, &c., 45 plots of freehold building land	£463

August 16.—By G. B. HILLIARD & SON (at Brentwood).

Ingrave, Essex.—The Grange and 4 a. 1 r. 37 p.; also two cottages adjoining, f.	1,490
Blackmore, Essex.—Shop premises with stabling, f., r. 28*l.*	340

August 18.—By NEWMAN & NEWMAN (at Colchester).

Tolleshunt, D'Arcy Essex.—Tolleshunt D'Arcy Hall Estate, 248 a. 0 r. 7 p., f.	3,050
The Hill Farm, 65 a. 0 r. 33 p.; also a field of arable land, 4 a. 3 r. 2 p., f.	800
Ardleigh, Essex.—Crockleford Heath, Duncannon's Farm, also Little Field, 37 a. 1 r. 13 p., f.	528
Flowton, &c., Suffolk.—Flowton Brook Farm, 154 a. 0 r. 7 p., f.	1,925
Otley, Suffolk.—Otley Hall Farm, 208 a. 1 r. 19 p., f.	2,650
The Poplar Farm, 88 a. 2 r. 6 p., f.	775
The Grange Farm, 130 a. 1 r. 4 p.; also an enclosure of garden ground, 1 a. 2 r. 0 p., f.	1,430
The Wood Farm, 49 a. 2 r. 23 p., f.	660

August 20.—By ALFRED SAVILL & SON.

Chadwell Heath, Essex.—Cat-lane, two enclosures of building land, 7 a. 3 r. 9 p., f.	1,540

August 21.—By PERKINS & SONS (at Salisbury).

Upton Lovell, &c., Wilts.—Middle Farm, 558 a., f.	4,400
Codford St. Peter, Wilts.—The village school and 1 r. 4 p., f.	185
Idmiston, Wilts.—Porton, Church Farm, 292 a., f.	2,360

August 22.—By J. F. BUNTING & CO.

Haverstock Hill.—101, Queen's-cres., u.t. 55 yrs., g.r. 8*l.*, r. 44*l.*	490
Finsbury Pk.—25, Somerfield-rd., u.t. 66 yrs., g.r. 6*l.* 5*s.*, r. 36*l.*	400

By H. R. FARNAN.

Pimlico.—188, Vauxhall Bridge-rd., f., r. 55*l.*	1,150
Oxford-st.—60, Poland-st., f.	1,685

By E. W. RICHARDSON & SON.

Muswell Hill.—1, Walery-villas, u.t. 84¼ yrs., g.r. 6*l.*, e.r. 45*l.*	400

August 23.—By C. P. WHITELEY.

Thornton Heath.—11 to 18, Garnet-rd.; also two plots of building land, f.	1,325

By NEWBON, EDWARDS, & SHEPHARD.

Barnsbury.—35 and 37, Bride-st., f., r. 56*l.*	920
Islington.—10, Cloudesley-st., u.t. 16½ yrs., g.r. 8*l.*, r. 50*l.*	310
Stoke Newington.—16, Shellgrove-rd., u.t. 72½ yrs., g.r. 3*l.* 10*s.*, r. 28*l.*	325
Brixton.—14 and 20, Vidal-rd., u.t. 82½ yrs., g.r. 13*l.* 10*s.*, r. 58*l.*	590
Kilburn.—9, 11, and 17, Chichester-rd., u.t. 57 yrs., g.r. 15*l.*	790
New Southgate.—125, High-rd., u.t. 66 yrs., g.r. 8*l.*, r. 40*l.*	425
Crouch End.—1 to 7, Edison-rd., u.t. 59 yrs., g.r. 42*l.*, r. 243*l.*	2,125
Edison-rd., f.g.r.'s 24*l.*, reversion in 60 yrs.	600
Crouch End Hill, f.g.r's 25*l.*, reversion in 60 yrs.	670

By STIMSON & SONS.

Shoreditch.—58 and 60, Great Cambridge-st., and 1 and 3, Holms-st., f.	£1,140
Knightsbridge.—8, Montpelier-st., u.t. 53½ yrs., g.r. 3*l.* 10*s.*, r. 60*l.*	280
King's Cross.—5 and 6, Southern-st., u.t. 26 yrs., g.r. 10*l.*	515
Chelsea.—5 and 6, Smith-ter., u.t. 44½ yrs., g.r. 10*l.*	640
Forest Gate.—18, 20, 22, 24, and 26, Tower Hamlet's-rd., f.	1,100
Wandsworth.—19, Bennerley-rd., f., e.r. 28*l.*	385
Blackfriars.—8 and 8, Duke-st., u.t. 8½ yrs., g.r. 16*l.*	110
Streatham.—115 and 117, Mitcham-lane, f., r. 110*l.*	1,230
65, 67, 69, and 71, Thrale-rd., f.	1,000
Anerley.—7, Oakfield-rd., f., r. 45*l.*	670
27, Station-rd., f., r. 30*l.*	445
Sydenham.—10, 12, 14, and 16, Acacia-rd., u.t. 67 yrs., g.r. 20*l.*	520
Norwood.—13 and 15, Whiteley-rd., u.t. 66 yrs., g.r. 12*l.*, e.r. 6*l.*	400
Brixton.—18, Stockwell Park-cres., u.t. 25 yrs., g.r. 7*l.*, e.r. 50*l.*	265

By WINDRUM & CLEAVE.

Cubitt Town.—26 and 28, Stebondale-st., u.t. 50½ yrs., g.r. 7*l.* 4*s.*	505
32, Ship-st., u.t. 50½ yrs., g.r. 6*l.* 15*s.*, r. 40*l.*	320
Mile End.—4 to 12 (even), Lindley-st., u.t. 17 yrs., g.r. 50*l.*	600
East Ham.—4, 6, 8, and 10, Lawrence-rd., u.t. 98 yrs., g.r. 22*l.*	725
13 to 29 (odd), Thackeray-rd., f.	3,095
Canning Town.—11 to 41 (odd), Carlton-st., u.t. 74½ yrs., g.r. 36*l.*	1,300
26, 28, and 30, Hoy-st., u.t. 96½ yrs., g.r. 13*l.* 10*s.*	340

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	s.	d.				
Hard Stocks	35	0	per thousand alongside, in river.			
Rough Stocks and Grizzles	31	0	,,	,,	,,	,,
Smooth Bright Facing Stocks..	58	0	,,	,,	,,	,,
Shippers	42	0	,,	,,	,,	,,
Flettons.....	29	6	,,	,,	at railway depôt.	
Red Wire Cuts ..	35	0	,,	,,	,,	,,
Best Fareham Red	71	6	,,	,,	,,	,,
Best Blue Pressed Staffordshire ..	87	0	,,	,,	,,	,,
Do., Bullnose	92	0	,,	,,	,,	,,
Best Stourbridge Fire Bricks	84	6	,,	,,	,,	,,
Best White Glazed Stretchers.....	260	0	,,	,,	,,	,,
Headers	240	0	,,	,,	,,	,,
Quoins and Bullnose	340	0	,,	,,	,,	,,
Double Headers..	320	0	,,	,,	,,	,,
Best Dipped Salt Glazed Stretchers and Headers ..	240	0	,,	,,	,,	,,
Quoins and Bullnose	280	0	,,	,,	,,	,,
Double Headers..	280	0	per thousand at railway depôt.			
Seconds Quality White and Dipped Salt Glazed	40	0	per thousand less than best.			

	s.	d.			
Thames and Pit Sand	8	0	per yard, delivered.		
Thames Ballast	6	9	,,	,,	
Best Portland Cement	36	0	per ton		
Best Ground Blue Lias Lime..	23	6	,,	,,	

NOTE.—The cement and lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 12*s.* 6*d.* per yard, delivered.
Stourbridge Fire-clay in sacks, 32*s.* 6*d.* per ton at rly. dpt.

STONE.

		s.	d.			
Ancaster in blocks		2	0	per ft. cube, deld. rly. depôt		
Bath	,, ...	1	7	,,	,,	
Beer	,, ...	1	6½	,,	,,	
Grinshill	,, ...	1	10	,,	,,	
Brown Portland in blocks		2	2	,,	,,	
Dacley Dale	,,	2	1½	,,	,,	
Red Corsehill	,,	2	5	,,	,,	
Red Mansfield	,,	2	4½	,,	,,	
Hard York	,,	2	10	,,	,,	
Hard York 6 in. sawn both sides landings, to sizes (under 40 ft. sup.)		2	7	per ft. super. at rly. depôt.		
,, ,, 6 in. Rubbed Ditto..		2	10½	,,	,,	
,, ,, 3 in. sawn both sides slabs (random sizes)		1	3	,,	,,	
,, ,, 3 in. self-faced Ditto		0	9	,,	,,	

SLATES.

in.	in.	£	s.	d.		
20	10 best blue Bangor..	11	5	0 per 1000 of 1200 at ry. dep.		
,,	best seconds ,,	10	15	0	,,	,,
16	8 best ,,	6	2	6	,,	,,
20	10 best blue Portmadoc ,, ...	10	18	0	,,	,,

[*See also page 203.*

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Cabmen's Shelter	Southport Corporation	20*l.*	Sept. 27
*Harbour Offices	Swansea Harbour Trustees	100*l.* and 50*l.*	Nov. 30

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., Supplied by	Tenders to be delivered
Tar Macadam	Branksome (Dorset) U.D.C.	S. J. Newman, Architect, 3, Tennyson-buildings, Branksome	Sept. 4
Ironwork	Leicester Corporation	E. G. Mawbey, Civil Engineer, Town Hall, Leicester	Sept. 5
Iron Railings (2,100 yards)	Southampton Corporation	W. B. G. Bennett, Civil Engineer, Municipal Offices	do.
Police Station, Castleton, Mon.	Standing Joint Committee	W. Tanner, County Surveyor, Monmouth	do.
Six Cottages, Springfield Estate, Northfleet		G. W. Cobham, Surveyor, 1, Edwin-street, Gravesend	do.
Additions to Schools, near Pontefract	Glass Houghton School Board	Garside & Pennington, Surveyors, Pontefract	do.
Stores, East-avenue, Keighley	Keighley Industrial Society, Ltd.	J. Haggas, Architect, North-street, Keighley	do.
Schools	Kirby (Essex) School Board	C. E. Butcher, Architect, Queen-street, Colchester	do.
Additions to Workhouse, Knutsford	Bucklow Union Guardians	R. J. M'Beath, Architect, Birnam House, Sale	do.
Homes for Children, Fishponds	Bristol Guardians	W. S. Skinner, Architect, Baldwin-street, Bristol	Sept. 6
Additions to School, Adamsdown	Cardiff School Board	James & Morgan, Architects, Cardiff	do.
Additions to School, Ferryhill	Aberdeen School Board	T. Rector, 22, Union-terrace, Aberdeen	do.
Farmhouse, Bessingby, Yorks.	Mr. A. G. W. Wright	J. Earnshaw, Architect, Bridlington Quay	do.
Warehouse, &c., Cemetery-road, Bradford		J. W. C. Atkinson, Architect, 1, Ivegate, Bradford	do.
Sewerage Works, Cartsdyke Harbour	Greenock Police Commissioners	Town Clerk, Greenock	do.
Electricity Buildings, Fratton-grove	Portsmouth Corporation	E. Rotter, Civil Engineer, Town Hall	do.
Additions to Slaughter House, Dudley Hill	Bradford Prov. Indus. Soc., Ltd.	Rycroft & Firth, Architects, Manchester-road, Bradford	do.
Business Premises, King-street, Lancaster	Mr. E. Johnson	J. Parkinson, Architect, Church-street, Lancaster	Sept. 7
Schools	Benwell School Board	J. W. Thompson, Architect, 63, Grey-street, Newcastle-on-Tyne	do.
Septic Tanks	Chippenham R.D.C.	A. H. Lapham, Surveyor, Corsham	do.
*Coastguard Buildings at Cromer	Admiralty	See Advertisement	do.
Slating Works	Leicester Corporation	A. Colson, Civil Engineer, Millstone-lane, Leicester	Sept. 8
Church Restoration, Coley, Halifax		Boreham & Morton, Surveyors, 24, John-street, Sunderland	Sept. 10
Bandstand, South Park	Ilford U.D.C.	H. Shaw, Civil Engineer, 7, Cranbrook-road, Ilford	do.
Bridge Works, Witton (Contract 1)	Trustees of Mr. J. Deykin	J. E. Willcox, Civil Engineer, 63, Temple-row, Birmingham	do.
Road Works, Back Weston-road	Jarrow Corporation	J. Petree, Borough Surveyor, Grange-road, Jarrow	do.
Alterations to Hall, Stradbroke	East Suffolk County Council	H. Miller, Civil Engineer, 16, Museum-street, Ipswich	do.
Sewers	Ripley (Derby) U.D.C.	R. Argile, Civil Engineer, Public Offices, Ripley	Sept. 11
Street Works, Crosley-street	do.	do.	do.
*Sewering, Levelling, Paving, &c.	Bromley U.D.C.	Surveyor, Council Offices, Bromley, Kent	do.
Pier Extension	Harrington (Cumb'd) Harbour Bd.	J. Eden, Civil Engineer, 58, Port-street, Workington	Sept. 12
*Flooring at Baths, Walthamstow	Walthamstow U.D.C.	See Advertisement	do.
*Addition, &c., to Baths and Washhouses at Workhouse	Fulham Guardians	D. Matthews, Architect, 650, Fulham-road, S.W.	Sept. 13
*Breeze	Commercial Gas Company	See Advertisement	do.
*White Flare Burnt Chalk Lime	do.	Engineer, Commercial Gas Company, Stepney, E.	do.
*Improving the Sea Front at Minehead	Minehead U.D.C.	F. W. Roberts, Engineer, Taunton	Sept. 15
School, Meyrick-street	Pembroke Dock School Board	G. Morgan & Son, Architects, 24, King-street, Carmarthen	do.
School, Wolverhampton-road	Walsall School Board	Bailey & McConnell, Architects, Bridge-street, Walsall	do.
*Sanatorium in Great Sankey	Warrington Corporation	Borough Surveyor, Town Hall, Warrington	Sept. 18
Sewerage Works	Eastleigh and Bishopstoke U.D.C.	Lemon & Blizard, Engineers, Lansdowne House, Southampton	do.
Residence at Hospital, Limerick		W. H. Byrne, Architect, 20, Suffolk-street, Dublin	Sept. 21
*Infants' School	Merthyr Tydfil School Board	J. Llewellin Smith, Architect, Aberdare	do.
*School	Lichfield Grammar School	See Advertisement	Sept. 22
*Bridge	Sheffield Corporation	City Surveyor, Town Hall, Sheffield	Sept. 25
*Baths and Library	do.	do.	do.
Water Mains	Ulverston R.D.C.	W. F. Y. Molineux, Engineer, 3, Benson-street, Ulverston	Sept. 26
*Schools at Pleasley Hill, near Mansfield	Mansfield School Board	Vallance & Westwick, Archts., White Hart Chmbrs., Mansfield	Oct. 1
*School at Croyland-road	Edmonton School Board	See Advertisement	Oct. 2
*Porter's Lodge, &c.	Hertford and Ware Jt. Hosp. Bd.	Clerk, Town Hall, Ware, Herts	Oct. 8
*School at West Hampstead	Aske's Haberdashers' School	See Advertisement	No date
Four Villas and Cottage, Belgrave-rd., Stoke-on-Trent		W. Wood, Architect, Stafford-street, Loughton	do.
Schools, Manston, Leeds		Chorley & Co., Architects, 15, Park-row, Leeds	do.
Three Houses, Nottingham		W. O. Hickson, Architect, 13, Victoria-street, Nottingham	do.
Business Premises, Hills-terrace, Cardiff	Mr. T. Jenkins	R. & S. Williams, Architects, Wharton-street, Cardiff	do.
House, Rubislaw Den South, Aberdeen		A. Clyne, Architect, 123, Union-street, Aberdeen	do.
Factory, Tralee, Ireland	Co-operative Wholesale Society	F. E. L. Harris, Architect, 1, Balloon-street, Manchester	do.
Schools, Arkwright Town, near Chesterfield	Staveley Iron and Coal Company	Secretary, Company's Offices, near Chesterfield	do.
Additions to Business Premises, Hyde	Mr. A. Stansfield	F. W. Dixon, Architect, Trevelyan-buildings, Manchester	do.

PUBLIC APPOINTMENTS

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Timekeeper, Jr. Clerk, and 2 Temporary Draughtsmen	Wimbledon U.D.C.	35s., 15s., 40s. per week respectively	Sept. 17

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv, vi. viii. x. & xxi. Public Appointments, pp. xviii. & xxi.

PRICES CURRENT (*Continued*).

	£ s. d.	
In. In.		
16 × 8 best blue Portmadoc	6 0 0	per 1000 of 1200 at ry. dep.
20 × 10 best Eureka unfading green	11 2 6	,, ,,
16 × 8 ,, ,,	6 13 0	,, ,,
20 × 10 Permanent green and Sedan green	10 0 0	,, ,,
16 × 8 ,, ,,	5 12 6	,, ,,

TILES.

	s. d.	
Best plain red roofing tiles	41 6	per 1,000 at rly. depôt.
Hip and valley tiles	3 7	per doz. ,, ,,
Best Broseley tiles	48 6	per 1,000 ,, ,,
Hip and valley tiles	4 0	per doz. ,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 ,, ,,
Do. ornamental Do.	60 0	,, ,, ,,
Hip tiles	4 0	per doz. ,, ,,
Valley tiles	3 9	,, ,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	50 9	per 1,000 ,, ,,
Hip tiles	4 1	per doz. ,, ,,
Valley tiles	3 8	,, ,, ,,

WOOD.

BUILDING WOOD.—YELLOW.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in. and 3 in. by 7 in. and 8 in.	12 10 0	13 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	,, ,, ,,
	At per load of 50 ft.	
Fir timber: Best middling Danzig or Memel (average specification)	4 5 0	4 10 0
Seconds	3 17 6	4 5 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Swedish balks	2 15 0	3 0 0
Pitch pine timber (35 ft. average)	4 0 0	4 10 0
JOINERS' WOOD.	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	27 10 0	28 10 0
3 in. by 9 in.	24 0 0	25 0 0
Battens, 2½ in. and 3 in. by 7 in.	20 0 0	21 0 0
Second yellow deals, 3 in. by 11 in.	22 10 0	24 0 0
,, ,, 3 in. by 9 in.	20 0 0	21 0 0
Battens, 2½ in. and 3 in. by 7 in.	16 10 0	18 0 0
Third yellow deals, 3 in. by 11 in. and 9 in.	16 10 0	17 10 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	24 0 0	25 0 0
Do. 3 in. by 9 in.	21 0 0	22 0 0
Battens	16 0 0	17 0 0
Second yellow deals, 3 in. by 11 in.	18 0 0	19 10 0
Do. 3 in. by 9 in.	16 10 0	17 10 0
Battens	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in.	14 10 0	15 10 0
Do. 3 in. by 9 in.	13 10 0	14 10 0
Battens	12 0 0	13 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	15 10 0	16 10 0
,, ,, ,, 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 10 0	12 10 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
,, ,, ,, 3 in. by 9 in.	12 10 0	13 10 0
,, ,, battens	10 10 0	11 10 0
Pitch pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—		
First, regular sizes	29 0 0	31 0 0
Broads (12 in. and up)	2 0 0	more.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Oddments	20 0 0	22 0 0
Kauri Pine—		
Planks, per ft. cube	0 3 6	0 4 0
Danzig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 2 8
Small ,, ,,	0 2 4	0 2 7
Wainscot Oak Logs, per ft. cube	0 5 6	0 6 0
Dry Wainscot Oak, per ft. sup. as inch	0 0 8	0 0 9
Mahogany—		
Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	16 0 0	20 0 0
American Whitewood Planks—		
Per ft. cube	0 2 3	0 3 0

JOISTS, GIRDERS, &c.

	In London, or delivered to Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	9 7 6	- - -
Compound Girders ,, ,,	13 10 0	- - -
Angles, Tees and Channels, ordinary sections	12 10 0	14 10 0
Flitch Plates	12 0 0	- - -

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON.—		
Common Bars	10 0 0	10 12 0
Staffordshire Crown Bars, good merchant quality	11 5 0	11 15 0
Staffordshire "Marked Bars"	13 5 0	- - -
Hoop Iron, basis price	11 5 0	11 15 0
,, ,, galvanised	17 0 0*	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	12 10 0	- - -
,, ,, to 24 g.	12 13 0	- - -
,, ,, to 26 g.	13 15 0	- - -

PRICES CURRENT (*Continued*).

	Per ton, in London. £ s. d.	£ s. d.
Sheet Iron, Galvanised, flat, ordinary quality.—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	14 15 0	- - -
,, ,, 22 g. and 24 g.	15 5 0	- - -
,, ,, 26 g.	16 15 0	- - -
Sheet Iron, galvanised, flat, best quality.—		
Ordinary sizes to 20 g.	18 10 0	- - -
,, ,, 22 g. and 24 g.	19 0 0	- - -
,, ,, 26 g.	20 10 0	- - -
Galvanised Corrugated Sheets.—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	14 0 0	14 15 0
,, ,, 20 g. and 24 g.	14 15 0	15 10 0
Cut nails, 3 in. to 6 in. (Under 3 in. usual trade extras.)	11 10 0	- - -
LEAD—Sheet, English, 3 lbs. & up.	20 7 6	- - -
Pipe in coils	20 17 6	- - -
ZINC—Sheet—		
Vieille Montagne ton	28 0 0	- - -
Silesian	27 10 0	- - -
COPPER—		
Strong per lb.	0 1 0	- - -
Thin ,,	0 1 2	- - -
Copper nails ,,	0 1 3	- - -
TIN—English Ingots ,,	0 1 7	- - -
SOLDER—Plumbers' ,,	0 0 8	- - -
Tinmen's ,,	0 0 10	- - -
Blowpipe ,,	0 1 0	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	2¾d. ,, ,,
21 oz. thirds	3½d. ,, ,,
,, ,, fourths	3d. ,, ,,
26 oz. thirds	4½d. ,, ,,
,, ,, fourths	4d. ,, ,,
32 oz. thirds	5½d. ,, ,,
,, ,, fourths	5d. ,, ,,
Fluted sheet, 15 oz.	3½d. ,, ,,
,, ,, 21 ,,	4½d. ,, ,,
½ Hartley's Rolled Plate	3d. ,, ,,
⅜ ,, ,, ,,	3½d. ,, ,,
½ ,, ,, ,,	4d. ,, ,,

OILS, &c.

	£ s. d.	
Raw Linseed Oil in pipes	per gallon 0 3 1	
,, ,, ,, in barrels	,, 0 3 2	
,, ,, ,, in drums	,, 0 3 4	
Boiled ,, ,, in pipes	,, 0 3 4	
,, ,, ,, in barrels	,, 0 3 5	
,, ,, ,, in drums	,, 0 3 7	
Turpentine, in barrels	,, 0 2 6	
,, in drums	,, 0 2 9	
Genuine Ground English White Lead	per ton 27 10 0	
Red Lead, Dry	,, 25 0 0	
Best Linseed Oil Putty	per cwt. 0 9 6	
Stockholm Tar	per barrel 1 7 0	

VARNISHES, &c.

	per gallon. £ s. d.
Fine Elastic Copal Varnish for outside work	0 16 6
Best Elastic Copal Varnish for outside work	1 0 0
Best Elastic Carriage Varnish for outside work	0 16 6
Best Hard Oak Varnish for inside work	0 10 6
Best Extra Hard Church Oak Varnish for inside work	0 10 6
Fine Hard Copal Varnish for inside work	0 16 0
Best Hard Copal Varnish for inside work	1 0 0
Best Hard Carriage Varnish for inside work	0 16 0
Extra Pale Paper Varnish	0 12 0
Best Japan Gold Size	0 10 0
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 9 0
Berlin Black	0 15 6
Knotting	0 10 0
Best French and Brush Polish	0 10 0

TO CORRESPONDENTS.

U. O. I.—F. F.—"Nemo."—(Consult a builder in the neighbourhood in which you think of building.) T. H. T.—(Amounts should have been stated.)

NOTE.—The responsibility of signed articles, letters, and papers read at meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of tenders accepted unless the amount of the tender is given, nor any list in which the lowest tender is under £100, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BURTON-ON-TRENT.—For boundary wall to school buildings, Horninglow, for the School Board. Mr. Reginald Churchill, architect, St. Paul's-square, Burton-on-Trent:—

W. A. Stevenson	£188 10	H. Edwards, Burton-on-Trent*	£160 0
Lowe & Sons	183 0		

CLEETHORPES.—For the erection of electric power station, chimney shaft, car sheds, workshops, &c., in Pelham-road, for the Great Grimsby Tramways Company. Mr. John Glenn, C.E., architect. Mr. J. Fereday Glenn, surveyor, 11, Queen Victoria-street, London, and 346, Cleethorpe-road, Grimsby:—

	Power Station.	Depôt.	Total
Thompson & Sons	£7,987	£6,059	£14,046
Frere & Co.	7,800	5,845	13,645
Hewins & Goodhand	7,500	5,440	12,940
H. Marrow	6,522	4,951	11,473
Wilkinson & Houghton, Grimsby*	6,310	5,003	11,313

COSELEY.—For the erection of a temporary iron school at Broad Lanes, for the Sedgley School Board. Mr. S. Henry Eachus, architect, Wolverhampton and Birmingham:—

E. C. & J. Keay, Birmingham* £516

FRIMLEY.—For sewering, &c., Frimley-road, Urban District Council. Mr. W. J. Hodgson, surveyor, High-street, Camberley:—

R. W. Swaker	£233 10	T. Turner	£47 0
H. C. Brixey*		5s. 3d. per yard run	

FRIMLEY.—For the execution of sewerage works, for the Urban District Council. Mr. W. J. Hodgson surveyor, High-street, Camberley:—

R. W. Swaker	£221 0 0	T. Turner	£125 17
H. C. Brixey*	157 0 0		

HENDON.—For private street works and bacteria filter, for the Urban District Council of Hendon. Mr. S. Slater Grimley, Engineer and Surveyor:—

Colin Deep-lane Works.

Thos. Adams	£3,833 0	Nowell & Co.	£3,121 11
Neave & Son	3,463 0	R. Ballard, Ltd., Child's Hill*	2,895 0
Mowlem & Co.	3,689 0		

Sewage Outfall Works, Bacterial Filter No. 3 (Labour only).

Thos. Adams	£715 5 6	R. Ballard, Ltd., Child's Hill*	£563 0 0
Neave & Son	573 0 0		

[Council find all materials.]

INVERKIP, N.B.—For the construction of a torage reservoir, &c., for the District Committee. Mr. James Murray, C.E., County Buildings, Paisley:—

W. G. Flett	£1,809 12
Peter Bow	1,509 9 11
Hugh Hastie	1,166 1 0
Cunningham & Sons, Kilmalcolm*	1,140 17 6
James Keanie‡	915 2 6

‡ Too late.

LICHFIELD.—For additions to workhouse, Trent Valley-road, for the Guardians of the Poor of the Lichfield Union. Mr. W. H. Woodroffe, architect, 214, Great Dover-street, London, S.E.:—

H. Smith & Sons	£6,212 10	Parnell & Son	£4,781 0
F. N. Stephens	5,895 0	Lowe & Sons	4,617 0
T. Smith & Sons	5,098 0	W. Harvey Gibbs, Birmingham*	4,350 0
Dorse & Co.	4,905 0		
Willcock & Co.	4,850 0		

LONDON.—For alterations to 11, Old Queen-street, Westminster, S.W., for Mr. John Jeffreys. Mr. Cecil A. Sharp, architect, 11, Old Queen-street, Queen Anne's Gate, S.W.:—

Huntley Bros. £223 15 | F. & H. F. Higgs* £203 0

LONDON.—For temporary annexes, Church-lane, Tooting, for the Wandsworth and Clapham Guardians. Mr. Cecil A. Sharp, architect, 11, Old Queen-street, Queen Anne's Gate S.W.:—

Contract No. 1.

Foster Bros.	£10,338	Akers & Co	£7,426
Leslie & Co.	9,103	Wall & Co.	7,403
J. B. Potter	8,209	Lascelles & Co.	7,250
Martin Wells	7,693	R. A. Jewell, North-street, Wandsworth*	7,134
F. & H. F. Higgs	7,590	Huntley Bros.	6,595
E. Wall	7,580		
F. G. Minter	7,573		

Contract No. 2.

Foster Bros.	£8,175	Akers & Co.	£5,273
Leslie & Co.	6,366	Wall & Co.	5,189
J. B. Potter	5,899	Lascelels & Co.	5,175
Martin Wells	5,676	E. Wall	4,944
F. G. Minter	5,323	Huntley Bros., Tamworth-rd., Croydon*	4,651
F. & H. F. Higgs	5,247		

LONDON.—For the erection of shops and residences at the corner of Dawes-road and Hannel-road, Fulham, for Mr. F. Batty. Mr. W. Thomas, surveyor, 12, Waldemar-avenue, Fulham, S.W.:—

S. Knight	£1,945 0	Swan & Son	£1,675 0
T. Bendon	1,712 0	E. Wall*	1,424 5

OTLEY.—For the erection of store premises, Gay-lane, for the Leeds Industrial Co-operative Society, Limited:—

Joinery.—Patrick & Son, Otley	£351 0 0
Plumbing.—Tuttle & Son, Otley	102 10 0
Slating.—R. Nelson, Ilkley	47 6 0
Painting.—Bennett & Sons, Otley	43 18 3
Plastering.—W. Laycock, Otley	24 10 0
Excavating, Brick, and Masonry.— W. Maston, Otley	960 0 0

[*See also next page.*

PAIGNTON (Devon).—For the completion of new road, Paignton, for Mr. W. M. G. Singer. Mr. W. G. Couldrey, architect. Quantities by Mr. V. C. Brown, Paignton :—

E. Westlake	£492 10 0	C. & R. E. Drew*	£485 0 0
Webber & Sons	487 6 0		

POOLE.—For kerbing, &c., Langley-road, Upper Parkstone, for the Town Council. Mr. J. Elford, Borough Surveyor, Poole :—

Grounds & Newton	£346 0 0
G. T. Budden	284 17 6
H. C. Brixey, Newtown, Poole*	260 7 1

POULTON-LE-FYLDE.—For paving, kerbing, &c., the Market-place, for the Urban District Council. Mr. W. Gornall, surveyor, Market-place, Poulton-le-Fylde. Quantities by surveyor :—

W. Ward	£214 4 4	R. Bashall, Preston*	£142 6 6
R. Lewtas	194 18 3		
J. Farrel	167 8 9		

[Surveyor's estimate, £170.]

RETFORD.—For the rebuilding of Ship Inn Cottage and stables for the Home Brewery, Daybrook. Messrs. Eyre & Southall, architects, Retford :—

G. Fenton	£1,577 0	G. Hurst	£1,411 10
T. Hopkinson	1,486 10	F. Fenton*	1,405 0

[All of Retford.]

RETFORD.—For new stables, loose boxes, and carriage houses, for the White Hart Hotel. Messrs. Eyre & Southall, architects, Retford :—

G. Fenton	£1,120	T. Hopkinson	£1,050
C. Jones	1,096	G. Hurst*	1,017

[All of Retford.]

RETFORD.—For building new shop, Carolgate, for Dr. Trevor Pritchard. Messrs. Eyre & Southall, architects, Retford :—

G. Fenton	£1,073	C. Jones	£990
F. Fenton	1,005	T. Hopkinson*	926

[All of Retford.]

ROEHAMPTON.—For erecting a detached house on the Spencer Lodge Estate for Mr. Cyril Bennett. Mr. T. Merrison Garrood, architect and surveyor, 172, Fenchurch-street, E.C. :—

James Dooley, Red Lion-lane, Surbiton* .. £1,000

ROEHAMPTON.—For three detached houses, Rodway-road. Mr. T. Merrison Garrood, architect and surveyor, 172, Fenchurch-street, E.C. :—

J. Dooley, Red Lion-lane, Surbiton* (each) £800

SANDOWN (Isle of Wight).—For the erection of an electric light and power station to supply Sandown and Shanklin, for Messrs. Edmundson's Electricity Corporation, Westminster. Mr. G. A. Bligh Livesay, architect, Wilts and Dorset Bank-chambers, Boscombe, Bournemouth. Quantities by Messrs. Jennings & Goater, Bournemouth :—

Ball & Son, Cowes, I.W. * £3,407 10

SEDGLEY.—For additions and alterations to Hurst Hill Schools, for the Sedgley School Board. Mr. S. Henry Eachus, architect, Wolverhampton and Birmingham. Quantities by Mr. Vale, Wolverhampton :—

Lindsay Jones	£2,698	Hilton & Caswell	£2,596
Wilcock & Co.	2,652	Cave	2,565
Ham	2,627	Skett	2,504
Herbert	2,605	Mark Round, Dudley*	2,350

TONBRIDGE (Kent).—For the supply of 1,300 tons Quenast granite for the Urban District Council. Mr. W. L. Bradley, C.E., Tonbridge Castle :—

C. M. Manuelle, London* ..... 13s. 6d. per ton.

TONBRIDGE (Kent).—For making up, &c., Medway Wharf-road, for the Urban District Council. Mr. W. L. Bradley, C.E., Tonbridge Castle :—

W. H. Wheeler, London* £1,092

TONGE.—For new chancel, organ chamber, vestries, side chapel, and one bay of nave, St. Michael's Church, Tonge. Messrs. Austin & Paley, architects, Lancaster. Quantities by Messrs. Wright & Son, surveyors, Lancaster :—

Grundy, Sons, & Co., Middleton* £4,760 10

WREXHAM.—For the execution of sewerage works, &c., for the Rural District Council. Mr. J. Price Evans, engineer, Argyle-chambers, Wrexham :—

Davis Bros.	£3,911 0 9	Jenkins & Jones, Johnstown*	£3,550 0 0
J. Phoenix	3,824 8 1½		
Harris & Son	3,790 0 0	Geo. Halbert	3,538 0 0

WYE.—For alterations to Oxenturn, Wye, Kent, for Mrs. Haines. Mr. Cecil A. Sharp, architect, 11, Old Queen-street, Queen Anne's Gate S.W. :—

G. F. Davis	£406 0 0	Huntley Bros., Croydon*	£345 0 0
H. Knock	387 5 2		

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